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ABSTRACT

This is the teacher's manual to accompany part 2 of the workbook for grade 5 pupils in the Comprehensive Instructional Management System, a teacher-designed unified mathematics curriculum for kindergarten through grade 7. It is composed of a curriculum, a testing component, and a computer-managed reporting system. The curriculum is organized into modules of similar skills or understandings from 14 topics. Each module has: a suggested period of duration for student mastery; a listing of new skills to be mastered by the student in the form of performance objectives; a section devoted to vocabulary, terms, and symbols; getting-started activities on prerequisite skills in preparation for undertaking new objectives; strategies for teaching the new skills; and student activities for providing reinforcement for the newly learned objective. After the sequence of modules and content by topic are displayed, teaching suggestions for 67 modules on 115 performance objectives are given. The content is from the topics of: numbers and numeration; addition; subtraction; fractions; geometry; measurement; algebraic concepts; graphs, probability, and statistics; and problem solving, plus review. Pages from the student's workbook are interspersed among the suggested activities. (MNS)

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CIMS

COMPREHENSIVE INSTRUCTIONAL MANAGEMENT SYSTEM

A Cyclical Mathematics Curriculum

PART 2—TEACHER

SE 045 526

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See catalogue for price.

FOREWORD

The Comprehensive Instructional Management System (CIMS) is a unified mathematics curriculum for grades K-7. The curriculum is cyclical in design, and reflects the most recent New York City and New York State guidelines.

Utilizing the experience of our system's teachers, we have developed a teacher-designed curriculum that includes a rich selection of classroom-tested successful mathematics activities. The major goal of the CIMS mathematics project is to provide the classroom teacher with a well-structured, objective-based curriculum. All objectives are supported by a variety of strategies. Student mastery of these objectives is readily diagnosed through the system's testing component.

The curriculum format is structured to allow the teacher to determine the ability level of the students in the topic under study, and to permit the students to move forward at their individual rates. Each module of instruction provides the teacher with a set of related performance objectives. These objectives are supported by activities which probe and develop the students' readiness to undertake new skills and concepts. Further reinforcement is given to mastery of the objectives through accompanying student workbooks.

It is hoped that this curriculum will not only assist teachers in developing vital mathematics instruction, but will serve to expand and enrich students' mathematics skills.

Charlotte Frank

Charlotte Frank,
Executive Director
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ACKNOWLEDGMENTS

The Comprehensive Instructional Management System (CIMS) was developed as a project of the Division of Curriculum and Instruction, Charlotte Frank, Executive Director. Dr. Peter Negroni, Community School Superintendent CSD 12; Dr. Harvey Garner, Community School Superintendent CSD 18; Carlos Edwards, Community School Superintendent CSD 23, and Joseph Pacheco, Community School Superintendent CSD 32 supervised the overall development of the CIMS program within their respective districts.

Morris Freedman, Director of the Office of Curriculum Development and Support; Irwin Kaufman, Director of Mathematics; Kenneth Bates, Director of CIMS; Maria DeSalvio, Assistant Director of Mathematics; Arthur Flug and Doreen Genkin, Assistant Directors of CIMS and Gene Menchini, Program Manager, Distributive Systems, Office of Data Processing Coordination provided overall supervision of this project.

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INTRODUCTION

The Comprehensive Instructional Management System (CIMS) is a teacher-designed educational delivery system composed of a curriculum, a testing component and a computer managed reporting system.

Designed to support mathematics instruction in the classroom, CIMS provides a comprehensive cyclical mathematics curriculum for grades K through 7. Each manual describes the curriculum for a single level or grade. Teacher curriculum developers from elementary, intermediate and senior high schools utilized the most current New York City and New York State guidelines in formulating the curriculum's modules and sequence.

Curriculum Topics

The CIMS mathematics curriculum has been organized into the following 14 topics:

.01	Numbers and Numeration
.02	Addition of Whole Numbers
.03	Subtraction of Whole Numbers
.04	Multiplication of Whole Numbers
.05	Division of Whole numbers
.06	Fractions
.07	Decimals
.08	Integers
.09	Geometry
.10	Measurement
.11	Algebraic Concepts
.12	Graphs, Probability, Statistics
.13	Problem Solving
.14	Review

Modules of Instruction

The CIMS curriculum is organized into modules or groupings of similar skills or understandings. Each module has a suggested period of duration for student mastery, a listing of new skills to be mastered by the student in the form of performance objectives, a section devoted to vocabulary, terms and symbols, getting started activities which serve as prerequisite skills in preparation for undertaking new objectives, strategies for teaching the new skills and student activities for providing reinforcement for the newly learned objective. Note that the lesson duration is included only as a guideline to the teacher for planning purposes. The actual time required for each module will vary from class to class and from child to child depending on the needs of the students and the teacher's judgment.

Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the CIMS NEW YORK CITY MATHEMATICS CURRICULUM. Performance objectives with the greatest priority are so basic that unless the student acquires a satisfactory degree of competency in them, the student cannot progress. Such topics are marked A and mastery by all pupils is essential.

Performance objectives marked B are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked C are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary: A - Mastery of this objective is essential for progress. Opportunities for reinforcement should be provided throughout the school year.

B - These objectives are to be taught to all pupils. Mastery is not essential at this time because the topics will be further developed and reinforced.

C - Objectives of special interest.

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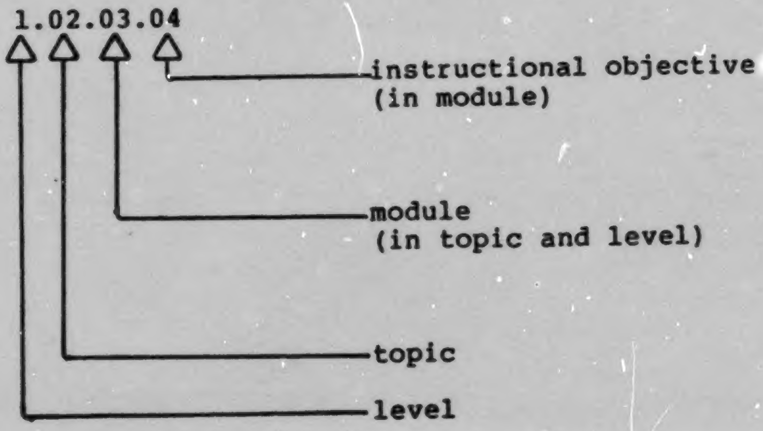
Topic Tab Key

01. Numbers and Numeration
02. Addition of Whole Numbers
03. Subtraction of Whole Numbers
04. Multiplication of Whole Numbers
05. Division of Whole Numbers
06. Fractions
07. Decimals
08. Integers
09. Geometry
10. Measurement
11. Algebraic Concepts
12. Graphs, Probability, Statistics
13. Problem Solving
14. Review

Module Coding Key


1.02.03.04
instructional objective (in module)
module (in topic and level)
topic
level

INSTRUCTIONAL SEQUENCE DESCRIPTION

An instructional sequence is given in list form on the following pages for this level. The sequence has been arranged to reflect what is considered the most effective presentation of the mathematics curriculum. Each module in the list is described by its unit number, module number, title, and page location.

The CIMS tests are integrated within the manual sequence. The test number is located in the first column. Each test is designed to assess priority objectives from the preceding modules. The tests are used to determine student mastery of specific performance objectives within these modules and appear in a multiple choice format. Each performance objective code number preceded by an * indicates that the performance objective is not tested on a CIMS test.

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INSTRUCTIONAL SEQUENCE - LEVEL 5

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
	1	5.09.01	Planes..................................	1
	2	5.14.01	Place value.............................	2
	3	5.01.01	Place value through hundred thousands......	3
5.01	4	5.01.02	Round 6-digit numbers......................	4
	5	5.14.02	Addition................................	5
	6	5.02.01	Addition of two addends through 6-digit numbers................................	6
	7	5.14.03	Subtraction.............................	7
	8	5.03.01	Subtraction through 6-digit numbers........	8
5.02	9	5.13.01	Sets....................................	9
	10	5.14.04	Fractions...............................	10
	11	5.06.01	Equivalent fractions.......................	12
	12	5.06.02	Greatest common factor (GCF) least common multiple (LCM)..........................	14
	13	5.10.01	Measurement - linear - $\frac{1}{16}$"...............	15
5.03	14	5.10.02	Linear measurement - metric................	16
	15	5.07.01	Decimals - thousandths.....................	17
	16	5.07.02	Addition and subtraction of decimals through thousandths.....................	18
	17	5.14.05	Multiplication..........................	19
	18	5.04.01	Multiplication of multiples of ten by multiples of ten........................	20
	19	5.04.02	Multiplication of two 2-digit numbers......	21
5.04	20	5.04.03	Multiplication of a 3-digit number by a 2-digit number.........................	23
	21	5.14.06	Division................................	25
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INSTRUCTIONAL SEQUENCE - LEVEL 5

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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	24	5.09.03	Angle measurement	29
	25	5.10.03	Perimeter	30
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	27	5.06.03	Multiplication of fractions	32
	28	5.06.04	Multiplication of mixed numbers	33
	29	5.12.01	Graphs	34
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	35	5.13.03	Problem solving - missing information	40
	36	5.09.04	Circles	41
5.07	37	5.12.03	Circle graphs	42
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	45	5.05.04	Division by 3-digit divisors	50

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INSTRUCTIONAL SEQUENCE FOR LEVEL 5

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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	47	5.06.05	Addition of fractions with unlike denominators	53
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CONTENT BY TOPIC

LEVEL 5

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5.06.02 Greatest common factor (GCF) least common multiple (LCM)................. 14
5.06.03 Multiplication of fractions............. 32
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5.14.03 Subtraction.............................. 7
5.14.04 Fractions................................ 10
5.14.05 Multiplication........................... 19
5.14.06 Division................................. 25

Unit 26

5.13.02 USE PRIOR KNOWLEDGE TO SOLVE PROBLEMS

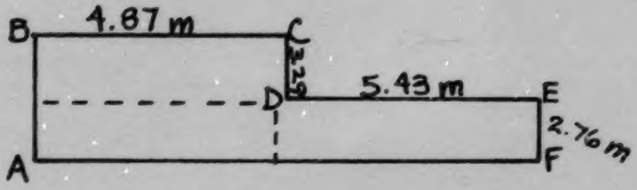
(3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.13.02.01A solve problems based upon a model using past knowledge;

e.g.,



Note: All angles are 90°. What is the perimeter of the polygon?

5.13.02.02A solve story problems using past knowledge.

e.g.,

Billy Big likes to give answers in large numbers. When asked how old his newborn baby brother was, he answered "11,520 minutes old." How old was Billy's brother?

GETTING STARTED

Write the following chart on the chalkboard.

60 minutes = ___ hour
1 dozen = ____
1 yard = ___ feet
24 hours = ___ day
7 days = ___ week

12 months = ___ year
$\frac{1}{2}$ year = ___ months
3 dozen = ___ eggs
4 yards = ___ feet
72 hours = ___ days

Say, "Copy this chart into your notebooks and fill in the blanks." Ask several students to fill in the chart on the chalkboard.

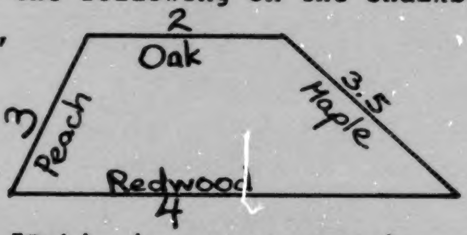
Say, "Pick any even number. Add 14. Multiply the sum by 2. Subtract 8 from the product. Divide the difference by 4. Subtract one-half of the original number."

Repeat this procedure using different even numbers. Say, "What do you find?" Elicit from students that the answer is always 5.

5.13.02

5.13.02.01 solve problems based upon a model using prior knowledge

STRATEGY 1: Draw the following on the chalkboard.
e.g.,



Say, "Robin jogs every morning. She starts at point X. She jogs down Oak Street turns on Maple Street to Redwood Street and back up Peach Street. How far does she run each morning? The path Robin takes forms a polygon. What is the distance around a polygon called?" (perimeter) Ask a student to write the mileage of each street on the chalkboard and add them. Say, "Robin jogs 12.5 miles every morning." Repeat this procedure using other examples.

STRATEGY 2: Prepare a chart with the following information.
e.g.,

Solids	Amount
Toast	1 oz. per slice
Apple	3 oz. per fruit
Meat	3 oz. per serving
Potato	2 oz. per serving
Cake	1.5 oz. per serving

Say, "Nancy is a nurse at Brookside Hospital. She keeps records of how many ounces of food each of her patients eats. Use the table to find the number of ounces of food each patient ate."
e.g.,

Mrs. Green	Mr. Blue	Mr. Brown
2 slices of toast	Meat	2 slices of toast
1 Potato	Apple	Meat
	2 slices of toast	Cake (2 servings)

5.13.02

5.13.02.02 **solve story problems using prior knowledge**

STRATEGY 1: Write the following problem on the chalkboard.

> Billy likes to give answers in large numbers. When asked how old his new born baby brother was, he answered, "11,520 minutes old." How old was Billy's brother?

Say, "What information does Billy give us? (age of the baby in minutes) What information can help us?" (how many minutes in an hour and hours in a day) Ask a student to find out how many hours there are in 11,520 minutes. (divide by 60) Ask another student to find the number of days in 192 hours. (divide by 24)

Repeat this procedure using other problems.

STRATEGY 2: Write the following on the chalkboard.

> There are 8 dozen stairs in the Lighthouse tower. Janis walked up 36 stairs. How many stairs does she still have to climb?

Say, "What do you need to know to solve this problem? (1 dozen = 12) Find the number of stairs in 8 dozen and subtract 36 from this amount."

e.g.,

$$\begin{array}{r} 12 \\ \underline{\times 8} \\ 96 \end{array} \text{ stairs} \qquad \begin{array}{r} 96 \\ \underline{-36} \\ 60 \end{array} \text{ stairs left to climb}$$

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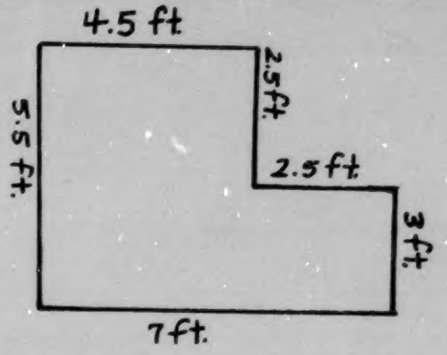
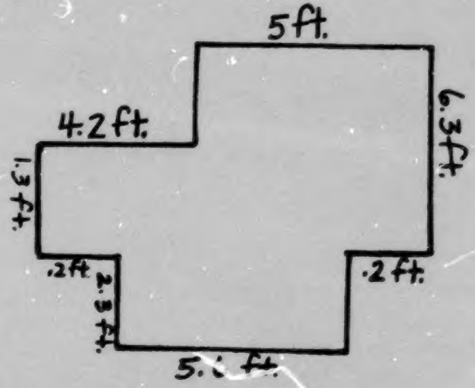
Solve both problems using the diagrams.


4.5 ft
2.5 ft.
5.5 ft.
2.5 ft
3 ft.
7 ft.

Tom is going to help his father put up a fence around their backyard. How much fencing do they need?


5 ft.
4.2 ft.
6.3 ft.
1.3 ft.
.2 ft
2.3 ft.
.2 ft.
5. ft.

Find the perimeter of this polygon.

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Solve each problem.

1. Jim will leave for Alaska on May 15. He will arrive there on June 23. How many days will his trip take?

2. Janis lives 4 dozen blocks away from her school. She has just walked 4 blocks. How many blocks does she have left?

3. Bill left his house at 3:00 p.m. He rode his bike for 312 minutes. What time was it when he returned home?

4. Mary took a train from New York to Florida, she traveled for 3 days. How many hours was Mary on the train?

Unit 27

5.06.03 MULTIPLICATION OF FRACTIONS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.03.01A multiply fractions having values less than 1;

e.g.,

$$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9} \qquad \frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$$

5.06.03.02A rename any whole number as a fraction with a denominator of 1;

e.g.,

$$16 = \frac{16}{1}$$

$$2 = \frac{2}{1}$$

$$3 = \frac{3}{1}$$

5.06.03.03A multiply a whole number by a fraction and rename in simplest terms;

e.g.,

$$6 \times \frac{1}{3} \qquad \frac{1}{3} \times 2$$

$$\frac{6}{1} \times \frac{1}{3} = \frac{6}{3} = 2 \qquad \frac{1}{3} \times \frac{2}{1} = \frac{2}{3}$$

5.06.03.04A solve word problems related to skills learned in this module.

e.g.,

You want $\frac{1}{2}$ lb. of raisins.
The raisins cost \$2.00 per pound.
How much does $\frac{1}{2}$ lb. cost?

$$\frac{1}{2} \times \$2.00$$

$$\frac{1}{2} \times \frac{\$2.00}{2} = \$1.00$$

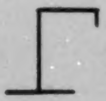
GETTING STARTED

Prepare a set of cards with examples showing addition of fractions.

e.g., $\boxed{\frac{1}{3} + \frac{4}{3}}$

Draw two "Hangman" stands on the chalkboard.

e.g.,



Divide the class into two teams. Say, "We are going to play Hangman. I will show you a card. You must add the fractions and name the sum in simplest form. For each incorrect answer, I will draw a part of a stick figure. The first team to have a completed figure loses the game." Show team A a card. Allow the team time to figure out the answer. Play rotates between both teams.

Prepare multiplication flash cards. Play "Multiplication Bee". Ask the students to stand. Show the first student a card.

e.g., $\boxed{\begin{array}{r} 5 \\ \underline{x5} \end{array}}$

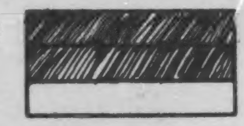
If the student names the product correctly, he/she remains standing. If the student is incorrect, he/she sits down. The last student to remain standing is the winner.

5.06.03

5.06.03.01 **multiply fractions having values less than 1**

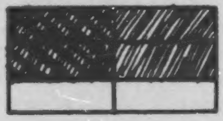
STRATEGY 1: Prepare and distribute blank paper. Say, "We can multiply a fraction by a fraction. Remember that the product will be smaller than either of the factors since we are finding a fraction of a fraction." Write $\frac{1}{2} \times \frac{2}{3}$ on the chalkboard. Ask the students to fold the sheet of paper in thirds and to shade $\frac{2}{3}$.

e.g.,



Ask the students to fold the paper in half the other way and shade $\frac{1}{2}$ of the $\frac{2}{3}$.

e.g.,



Say, "What fractional part of the paper is now shaded two ways?" ($\frac{2}{6}$) Write the number sentence on the chalkboard.

e.g., $\frac{1}{2} \times \frac{2}{3} = \frac{2}{6}$.

Repeat this procedure with other examples.

STRATEGY 2: Write the following examples on the chalkboard.

e.g.,

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$
$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$
$$\frac{1}{5} \times \frac{3}{4} = \frac{3}{20}$$
$$\frac{1}{4} \times \frac{5}{6} = \frac{5}{24}$$

Say, "When we multiply a fraction by a fraction, we follow a pattern. What did we do in each example to obtain the answer?" (multiplied the two numerators and multiplied the two denominators)

Repeat this procedure with other examples, asking the students to find and name the products.

5.06.03

5.06.03.02 **rename any whole number as a fraction with a denominator of 1**

STRATEGY 1: Say, "A numerator is the number of parts of the whole available and the denominator is the number of parts into which the whole is divided. In the fraction $\frac{4}{1}$, into how many parts is each unit divided? (1) About how many units are we talking? (4) Therefore, we can say that another name for $\frac{4}{1}$ is 4."

STRATEGY 2: Prepare twelve square sheets of paper (three folded into eighths, three into fourths, three into halves and three not folded). Tape the sheets folded into eighths on the chalkboard. Say, "On each sheet, what fraction is represented? ($\frac{1}{8}$) How many eighths are there altogether? (24) What name can we give to this arrangement?" ($\frac{24}{8}$ or 3) Next, tape up the sheets folded into fourths. Say, "What fraction does each part represent? ($\frac{1}{4}$) What name can we give to this arrangement?" ($\frac{12}{4}$ or 3) Tape up the sheets folded into halves. Say, "On each sheet what fraction is represented? ($\frac{1}{2}$) How many halves are there in all? (6) What can we call this picture?" ($\frac{6}{2}$ or 3) Tape up the unfolded sheets. Say, "On each sheet what fractional part is each section? ($\frac{1}{1}$) How many sections are there altogether? (3) What can we call this picture? ($\frac{3}{1}$ or 3) A whole number can be renamed as a fraction with a denominator of one."

5.06.03.03 **multiply a whole number by a fraction and rename in simplest terms**

STRATEGY 1: Prepare and display fractional parts in halves, thirds and sixths and a whole unit. Say, "This is one whole unit. What is the value of each of these parts? ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{6}$) How can we show the fraction $\frac{2}{6}$?" Tape 2 sixths to the chalkboard.

e.g.,

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5.06.03

STRATEGY 1: cont'd

Say, "If we want to show the example $5 \times \frac{2}{6} = \square$, how many groups of $\frac{2}{6}$ must we show?" (5) Tape four more groups of $\frac{2}{6}$ to the chalkboard. Say, How many sixths do we have now? ($\frac{10}{6}$) Can we make a whole unit from $\frac{10}{6}$? (Yes) How many sixths will we need for the whole unit? ($\frac{6}{6}$) If we remove $\frac{6}{6}$, how many sixths are left?" ($\frac{4}{6}$) Write the following on the chalkboard.

e.g.,

$$5 \times \frac{2}{6} = \frac{10}{6} = \frac{6}{6} + \frac{4}{6} = 1 + \frac{4}{6} = 1\frac{4}{6}$$

Say, "Can we still simplify the answer? (Yes) What part can be simplified? ($\frac{4}{6}$) What is the largest number that evenly divides 4 and 6? (2) What is $\frac{4}{6}$ written in simplest form?" ($\frac{2}{3}$) Write $5 \times \frac{2}{6} = 1\frac{2}{3}$ on the chalkboard.

Repeat this procedure using other fractions.

STRATEGY 2: Say, "We can multiply a whole number and a fraction by renaming the whole number as a fraction whose denominator is 1. We can, therefore, rename 4 as $\frac{4}{1}$." Write on the chalkboard: $4 \times \frac{2}{4} = \square$. Say, "What is the method for multiplying two fractions?" (multiply numerators and multiply denominators) Ask a student to come to the chalkboard and write the product, e.g., $\frac{4}{1} \times \frac{2}{4} = \frac{8}{4}$. Say, "Do we have enough fourths to make a whole unit? (Yes) How many fourths do we need to make a whole unit? (4) How many parts does the numerator show? (8) How many whole units can we make?" (2)

Repeat this procedure using other examples.

5.06.03.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

Fred had $\frac{3}{4}$ gallon of paint. He
painted a wall and used $\frac{1}{2}$ of the
paint. How much did he use?

STRATEGY 1: cont'd

Say, "Which operation do we use to find a fraction of a number?" (multiplication) Write $\frac{1}{2} \times \frac{3}{4} = \square$ on the chalkboard. Ask a student to come to the chalkboard and find the product ($\frac{3}{8}$), explaining how he/she found the answer (multiplied the numerators and multiplied the denominators). Say, "What does the number $\frac{3}{8}$ represent in this problem?" ($\frac{3}{8}$ gallon of paint) Label the answer on the chalkboard.

STRATEGY 2:

Write the following problem on the chalkboard.

> The reptile house at the zoo has 30 kinds of snakes. If $\frac{1}{5}$ of them are poisonous, how many snakes are poisonous?

Say, "Which operation do we use to find a fraction of a number? (multiplication) How can we rename 30 to help us do the multiplication? ($\frac{30}{1}$) What number sentence can we write?" ($\frac{1}{5} \times \frac{30}{1} = \square$) Ask a student to solve the example. ($\frac{30}{5}$) Say, "We can simplify $\frac{30}{5}$ by taking groups of $\frac{5}{5}$ out of $\frac{30}{5}$, but a faster way is to divide 30 by 5. The result will be the same. ($\frac{30}{5}$ or 6) In a problem, we must label the answer. What does the six represent?" (Snakes that are poisonous.) Write the complete answer on the chalkboard, e.g., 6 poisonous snakes.

P.O. 5.06.03.01

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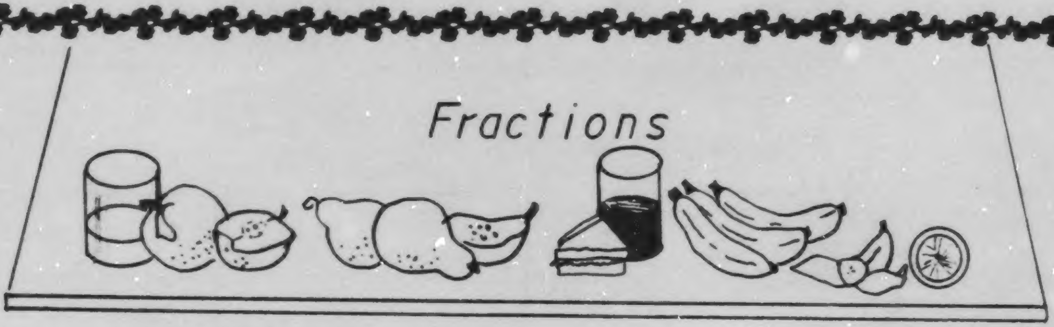
Multiply the fractions.



$\frac{1}{2} \times \frac{3}{5} =$

$\frac{2}{3} \times \frac{4}{5} =$

$\frac{1}{9} \times \frac{5}{6} =$

$\frac{5}{8} \times \frac{1}{6} =$

$\frac{4}{5} \times \frac{2}{7} =$

$\frac{3}{7} \times \frac{3}{10} =$

$\frac{1}{10} \times \frac{7}{10} =$

$\frac{3}{8} \times \frac{5}{7} =$

$\frac{6}{7} \times \frac{4}{5} =$

$\frac{3}{10} \times \frac{9}{10} =$

$\frac{4}{5} \times \frac{4}{7} =$

$\frac{1}{8} \times \frac{3}{4} =$

P.O. 5.06.03.02

NAME:____**CLASS:**__________**DATE:**________

Express each fraction as a whole number.
Rename each whole number as a fraction with a denomination of 1.

$\frac{16}{1} =$ ○	$\frac{19}{1} =$ ○	$\frac{100}{1} =$ ○	$\frac{145}{1} =$ ○
$\frac{26}{1} =$ ○	$\frac{49}{1} =$ ○	$\frac{38}{1} =$ ○	$\frac{70}{1} =$ ○
$18 = \frac{18}{1}$	$27 =$	$56 =$	$11 =$
$48 =$	$62 =$	$89 =$	$115 =$

P.O. 5.06.03.03

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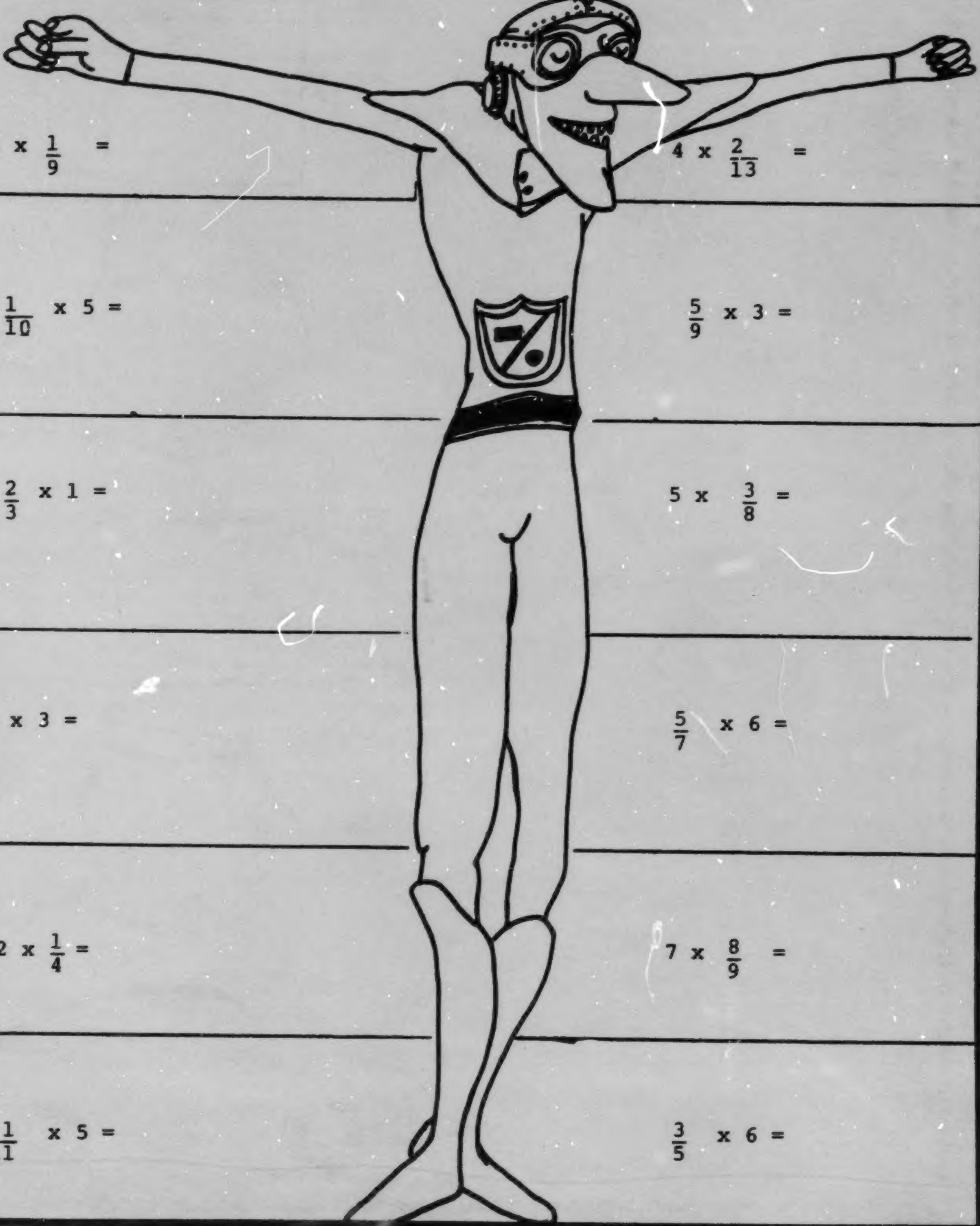
Multiply to find the correct answer.



$4 \times \frac{1}{9} =$

$4 \times \frac{2}{13} =$

$\frac{1}{10} \times 5 =$

$\frac{5}{9} \times 3 =$

$\frac{2}{3} \times 1 =$

$5 \times \frac{3}{8} =$

$\frac{1}{4} \times 3 =$

$\frac{5}{7} \times 6 =$

$12 \times \frac{1}{4} =$

$7 \times \frac{8}{9} =$

$\frac{1}{11} \times 5 =$

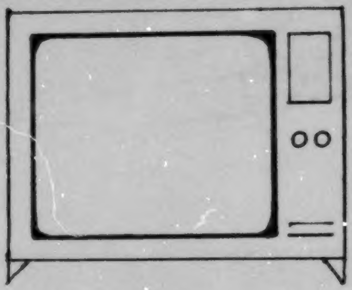
$\frac{3}{5} \times 6 =$

P.O. 5.06.03.04

NAME: ______________________ CLASS: __________ DATE: ________

Solve each problem. Write the answers in simplest form. Do your work in picture.

In a $\frac{1}{2}$ hour television show commericals take up $\frac{1}{6}$ of the time. What part of an hour do the commericals take up?



$\frac{1}{2}$ of a pizza is left over. If I eat $\frac{1}{4}$ of it, what part of the whole pizza have I eaten?

A recipe calls for $\frac{3}{4}$ cup of nuts. If Marilyn wants to make $\frac{1}{2}$ of the receipe what part of a cup of nuts should she use?

If a painter can paint a room in $\frac{1}{2}$ hour, how long will it take him to paint 6 rooms?

If a car burns $\frac{3}{5}$ gallon of fuel an hour, how much fuel will it burn in 5 hours?

Unit 28

5.06.04 MULTIPLICATION OF MIXED NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.04.01A multiply a whole number by a mixed number using horizontal format and rename in simplest terms;

e.g.,

$2 \times 3\frac{1}{3} =$ $\qquad$ $3\frac{1}{2} \times 2 =$

$\frac{2}{1} \times \frac{10}{3} = \frac{20}{3} = 6\frac{2}{3}$ $\qquad$ $\frac{7}{2} \times \frac{2}{1} = \frac{14}{2} = 7$

5.06.04.02B multiply a mixed number by a mixed number and rename in simplest terms;

e.g.,

$4\frac{1}{3} \times 3\frac{2}{6} =$

$\frac{13}{3} \times \frac{20}{6} = \frac{260}{18} = 14\frac{8}{18} = 14\frac{4}{9}$

5.06.04.03A solve word problems related to skills learned in this module.

e.g.,

You want $2\frac{1}{2}$ lbs. of almonds. The almonds cost \$2.40 per pound. How much money must you spend?

$2\frac{1}{2} \times \$2.40 =$

$\frac{5}{2} \times \frac{\$2.40}{1} = \frac{\$12.00}{2} = \$6.00$

5.06.04

VOCABULARY

TERMS

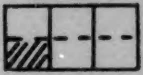
numerator
denominator
improper fraction
mixed number

GETTING STARTED

Write $\frac{1}{2} \times \frac{1}{3}$ on the chalkboard. Say, "This number sentence means the same as $\frac{1}{2}$ of $\frac{1}{3}$."

Draw the following on the chalkboard.

e.g.,

$\frac{1}{2}$ of $\frac{1}{3}$ =  or $\frac{1}{6}$

Say, "We can also find this answer by multiplying the numerators and multiplying the denominators to get the product $\frac{1}{6}$.

Prepare and distribute three paper rectangles (3" x 4") and scissors to each student. Write $2\frac{1}{4}$ on the chalkboard. Ask the students to fold one rectangle into fourths. Say, "Cut the folded rectangle into fourths. Place 2 wholes and 1 fourth on your desk. We want to express $2\frac{1}{4}$ as a fraction. Let us fold our 2 whole rectangles into fourths. How many fourths are there?" $(\frac{9}{4})$

Repeat this procedure using other examples.

5.06.04

5.06.04.01 **multiply a whole number by a mixed number using horizontal format and rename in simplest form**

STRATEGY 1: Write 2 x $2\frac{1}{3}$ on the chalkboard. Say, "Before we can multiply a whole number by a mixed number there are two things we must do. We must express the whole number as a fraction and rename the mixed number as an improper fraction."

Ask a student to come to the chalkboard and rewrite the example.

e.g., $\frac{2}{1} \times \frac{7}{3}$

Say, "When we multiply fractions we multiply the numerator times the numerator and the denominator times the denominator." Ask a student to complete the example.

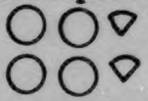
e.g., $\frac{2}{1} \times \frac{7}{3} = \frac{14}{3}$

Say, "How many wholes can we make? (4) How many thirds are left? (2) Our final product is $4\frac{2}{3}$."

Continue this procedure using other numbers.

STRATEGY 2: Prepare fractional pieces (wholes and thirds) and a flannel board. Write 2 x $2\frac{1}{3}$ on the chalkboard. Ask a student to make the arrangement that shows this multiplication example.

e.g.,



Say, "How many wholes? (4) How many thirds? (2) What is the product? ($4\frac{2}{3}$) We can solve this example without using material. Rename 2 as $\frac{2}{1}$, change $2\frac{1}{3}$ to $\frac{7}{3}$ and multiply." Write $\frac{2}{1} \times \frac{7}{3}$ on the chalkboard. Ask a student to multiply and rename the product in simplest terms.

Continue this procedure using other numbers.

5.06.04

5.06.04.02 **multiply a mixed number by a mixed number and rename in simplest terms**

STRATEGY 1: Write $1\frac{1}{2} \times 2\frac{1}{2} = \square$ on the chalkboard. Say, "Before we can multiply a mixed number by a whole number, we change both to improper fractions." Ask a student to come to the chalkboard and change the mixed numbers to improper fractions.

e.g., $1\frac{1}{2} \times 2\frac{1}{2} = \frac{3}{2} \times \frac{5}{2} = \frac{15}{4}$

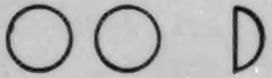
Say, "How do we find the product?" (multiply the numerators and multiply the denominators) Ask a student to do the multiplication. Say, "We can simplify the answer by dividing the denominator into the numerator."

e.g., $15 \div 4 = 3\frac{3}{4}$

Repeat this procedure using other examples.

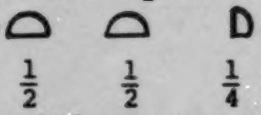
STRATEGY 2: Write $1\frac{1}{2} \times 2\frac{1}{2}$ on the chalkboard. Say, "This number sentence is the same as $(1 \times 2\frac{1}{2}) + (\frac{1}{2} \times 2\frac{1}{2})$. How can we represent $1 \times 2\frac{1}{2}$?" (2 whole circles and $\frac{1}{2}$ a circle)

e.g.,



Say, "How do we represent $\frac{1}{2} \times 2\frac{1}{2}$?" Ask the students to cut the $2\frac{1}{2}$ circles in half and display half of them.

e.g.,



Say "How many wholes can we make? (1) What fractional part is left? ($\frac{1}{4}$) Therefore, $\frac{1}{2} \times 2\frac{1}{2} = 1\frac{1}{4}$." Write $(1 \times 2\frac{1}{2}) + (\frac{1}{2} \times 2\frac{1}{2}) = 2\frac{1}{2} + 1\frac{1}{4}$ on the chalkboard. Say, "To combine the fractions, change $\frac{1}{2}$ to fourths." ($\frac{2}{4}$) Write $2\frac{2}{4} + 1\frac{1}{4} = \square$ on the chalkboard. Ask a student to come to the chalkboard and add the mixed numbers. ($3\frac{3}{4}$)

Repeat this procedure with other examples.

5.06.04

5.06.04.03 solve word problems related to skills learned in this module

STRATEGY 1: Prepare play money (5 one dollar bills) for each student. Write the following example on the chalkboard.

> You want $2\frac{1}{2}$ lbs. of chocolate. The chocolate costs \$2.00 per pound. How much money must you spend?

Say, "We will use our money to solve this problem. If a pound of chocolate costs \$2.00, what would two pounds cost? (\$4.00) What would $\frac{1}{2}$ pound cost? (\$1.00) How much would $2\frac{1}{2}$ lbs. cost? (\$5.00) Let's check." Write the following on the chalkboard.

$$2\frac{1}{2} \times \$2.00$$

$$\frac{5}{2} \times \frac{\$2.00}{1} = \frac{\$10.00}{2} = \$5.00$$

Repeat this procedure with other examples.

STRATEGY 2: Write the following problem on chalkboard.

> You want $2\frac{1}{2}$ lbs. of almonds. The almonds cost \$2.40 per pound. How much money must you spend?

Write $2\frac{1}{2} \times \$2.40$ on the chalkboard. Say, "How can we multiply a mixed number by a whole number?" (Change the numbers to improper fractions and multiply.)

e.g.,

$$\frac{5}{2} \times \frac{\$2.40}{1} = \square$$

Ask another student to multiply the numerators and the denominators. ($\frac{\$12.00}{2}$) Say, "How do we simplify $\frac{\$12.00}{2}$?" (Divide \$12.00 by 2.) Write $\frac{\$12.00}{2} = \$6.00$ on the chalkboard.

Repeat this procedure with other examples.

P.O. 5.06.04.01

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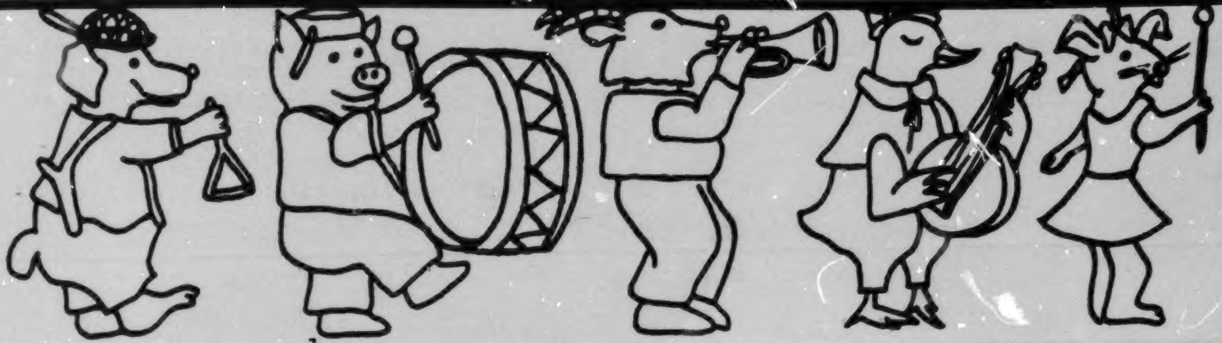
Multiply a whole number by a mixed number using horizontal format.



(A) $3 \times 2\frac{1}{4} =$

(B) $1 \times 6\frac{2}{3} =$

(C) $4\frac{1}{2} \times 3 =$

(D) $2\frac{2}{5} \times 2 =$

(E) $1\frac{1}{8} \times 6 =$

(F) $3\frac{1}{2} \times 4 =$

(G) $5 \times 1\frac{3}{4} =$

(H) $4 \times 2\frac{1}{2} =$

(I) $3 \times 5\frac{1}{3} =$

(J) $3 \times 6\frac{2}{3} =$

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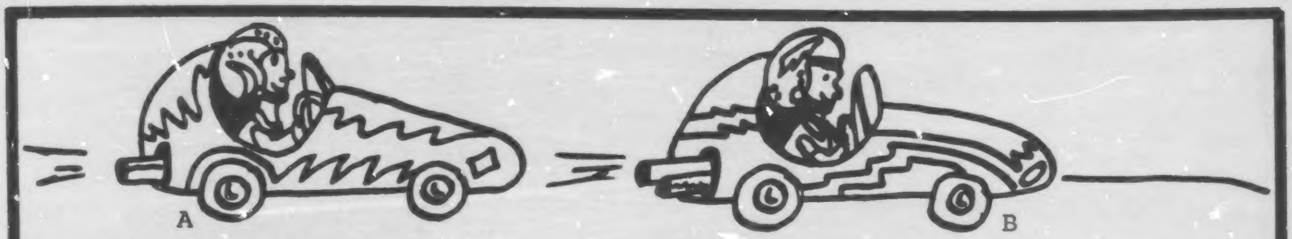
NAME:______________________________ CLASS:__________ DATE:________

Multiply a mixed number by a mixed number. Rename in simplest terms. Draw a line from the number sentence in column A to the answer in column B.

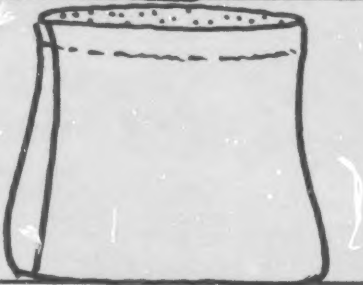
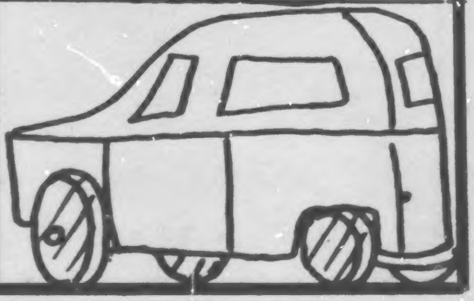


A		B
$3\frac{1}{4} \times 2\frac{1}{5} =$	a.	$8\frac{1}{8}$
$1\frac{1}{2} \times 2\frac{1}{3} =$	b.	$9\frac{1}{3}$
$1\frac{6}{7} \times 2\frac{1}{3} =$	c.	$3\frac{1}{2}$
$2\frac{2}{3} \times 3\frac{1}{2} =$	d.	$3\frac{3}{10}$
$6\frac{1}{2} \times 1\frac{1}{4} =$	e.	$2\frac{5}{8}$
$1\frac{3}{4} \times 1\frac{1}{2} =$	f.	$7\frac{1}{12}$
$1\frac{1}{5} \times 2\frac{3}{4} =$	g.	$7\frac{3}{20}$
$4\frac{1}{4} \times 1\frac{2}{3} =$	h.	$20\frac{1}{6}$
$3\frac{2}{3} \times 5\frac{1}{2} =$	i.	$4\frac{1}{3}$
$1\frac{3}{5} \times 2\frac{1}{2} =$	j.	4

P.O. 5.06.04.03

NAME:________________________________ CLASS:__________ DATE:________

Solve each word problem.

Michael bought 3 steaks. Each steak weighed $2\frac{1}{2}$ lbs. How much did the steaks weigh altogether? ________	
Joan can read $8\frac{1}{2}$ pages in a hour. How many can she read in $2\frac{1}{2}$ hours? ________	
There are 6 rabbits in a bag. Each rabbit weighs $7\frac{1}{2}$ lbs. How heavy is the bag? ________	
Joe can fill $10\frac{1}{4}$ bags of sand in an hour. How many can he fill in $3\frac{1}{3}$ hours? ________	
A car runs $15\frac{3}{4}$ miles on 1 gallon of gas. How far does it go on $4\frac{1}{2}$ gallons? ________	

5.12.01 GRAPHS

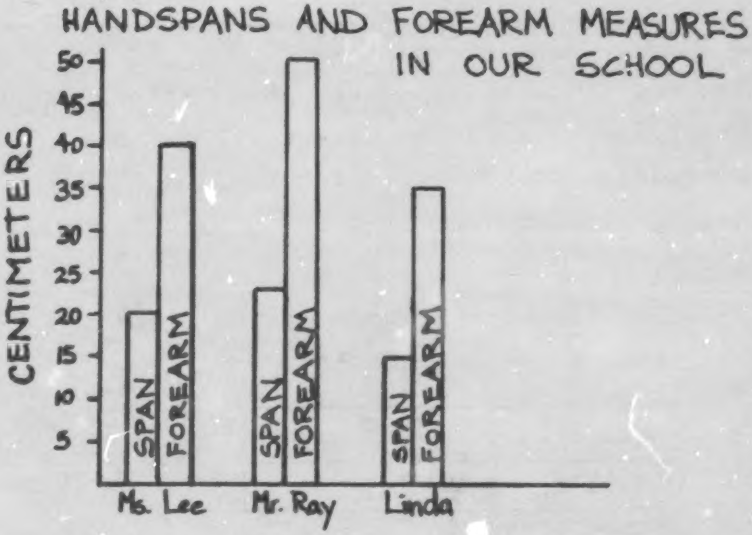
(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.12.01.01B construct and interpret a double bar graph;

e.g.,



Who has the longest forearm?

5.12.01.02B choose the appropriate graph to show information.

e.g.,

Which type of graph would we use to show rainfall in a month? (line, bar)

Which type of graph would show how I spent my day? (line, bar, circle, pictograph)

5.12.01

VOCABULARY

TERMS

double bar graph
data

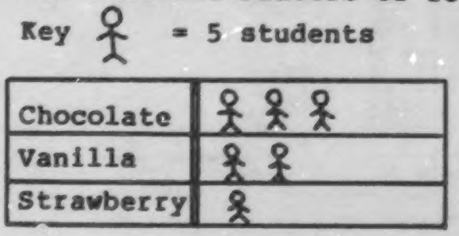
GETTING STARTED

Display various types of graphs (line, bar, circle and pictograph). Discuss and interpret information given by each graph. Compare graphs as to similarities and differences.

Ask the students to survey their friends to find out what is their favorite flavor of ice cream. Say, "We are going to make a pictograph to show this information."

Draw a graph on the chalkboard.
e.g.,

Our Favorite Flavors of Ice Cream



Say, "We will use 1 stick figure to represent 5 people." Ask the students to use the information in the graph to answer questions. e.g.,

How many students like chocolate? ...vanilla? ...strawberry?
How many more students like chocolate more than vanilla? ...than strawberry?

5.12.01

5.12.01.01 **construct and interpret a double bar graph**

STRATEGY 1: Say, "Imagine that you are having a contest to sell candy bars. Can you think of a graph that could show how many candy bars were sold by boys and how many were sold by girls on Monday through Friday? The graph used to show this is called a double bar graph. For each day of the week we must show the candy bars sold by the two groups. There are two variables involved in this graph." (day of the week and the number of bars sold) Draw an axis on the chalkboard. Ask a student to label the graph on the chalkboard.

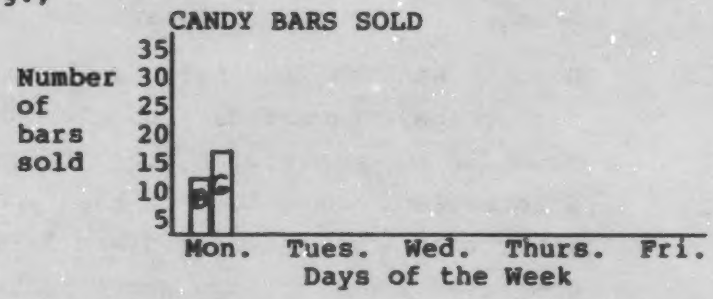
Say, "For each day of the week the number of candy bars sold by boys and the number of candy bars sold by girls must be shown separately. Therefore, there will be two bars showing how many candy bars were sold for each day of the week." Write the data on the chalkboard.

e.g.,

	B	G
M	12	15
T	18	17
W	10	18
Th	25	20
F	30	35

Complete the graph with the students.

e.g.,



Distribute graph paper and repeat this procedure using other data.

STRATEGY 2: Ask the students to draw two bar graphs to represent the following information.

e.g.,

Number of magazines sold by boys in 1 week		Number of magazines sold by girls in 1 week	
Mon.	20	Mon.	15
Tues.	10	Tues.	20
Wed.	15	Wed.	15
Thurs.	25	Thurs.	30
Fri.	30	Fri.	30

When the students have completed the activity, say, "We could combine this information into one graph. We call this type of graph a double bar graph." Draw the graph on the chalkboard. Give the students another set of data and ask them to construct a double bar graph.

5.12.01.02 choose the appropriate graph to show information

STRATEGY 1: Note data on the chalkboard appropriate for a circle graph, e.g., Household Budget. Say, "What type of graph would be most useful to represent this information?" (circle) Ask a student to come to the chalkboard and draw his/her circle graph. Say, "Some graphs are more appropriate to show certain kinds of data."

Repeat the procedure utilizing data for a double bar graph, line graph, bar graph and pictograph.

STRATEGY 2: Display samples of a bar, double bar, circle, line and pictograph. Record data on the chalkboard. Ask the students to construct a graph to represent the given information. Say, "Choose the type of graph you think would best show the data given." When students have completed the activity, ask volunteers to display their graphs. Data could include the following for representative graphs: family budget (circle), population of towns (pictograph), and a student's marks (bar/line).

P.O. 5.12.01.01

NAME: ______________________ **CLASS:** __________ **DATE:** ________

Construct a double-bar graph to represent the given data. Remember the importance of labels and headings.

Students Participating in School Activities

	4th grade	5th grade
Chorus	35	30
School Play	15	20
Field Day	50	55
Science Fair	25	25

Number of Students in Each Grade

	Boys	Girls
K	20	21
1	20	25
2	27	30
3	32	24
4	28	29
5	30	31
6	25	20

P.O. 5.12.01.02

NAME: ______________________ CLASS: ________ DATE: ________

Write the name of the graph you would use to show the information presented in each box.
Challenge! Try to draw the appropriate graph.

Color Shoes Worn by Boys and Girls

	Boys	Girls
Black	15	5
Brown	25	8
Red	3	9
White	1	10
Blue	5	12

Number of Different Kinds of Fish in an Aquarium

Angel fish	6
Guppies	10
Neons	5
Gold	4
Striped	7

Number of Cents Earned for Newspapers Delivered

5 newspapers delivered - 20 cents earned

How Susan Spends her Allowance

Entertainment	$\frac{1}{4}$
Clothing	$\frac{1}{4}$
Savings	$\frac{2}{5}$
Snacks	$\frac{1}{10}$

5.12.02 STATISTICS - MEAN AND MEDIAN

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.12.02.01A compute the arithmetic mean (average) to the nearest whole number;

e.g.,

$$\begin{array}{r} 75 \\ 80 \\ 90 \\ \underline{105} \\ 350 \end{array} \qquad \begin{array}{r} 87r2 \\ 4\overline{)350} \\ \text{mean} = 87 \end{array}$$

5.12.02.02B recognize that the median is the middle score when the group of scores is arranged according to size (limit to odd number of scores);

e.g.,

median

65 70 80 95 100

5.12.02.03A analyze collected data according to range and means.

e.g.,

The highest or lowest temperature of each day during a given month.

Day	Temperature
1st	75°
2nd	75°
3rd	77°
4th	65°
5th	67°
⋮	
29th	82°
30th	80°
31st	77°

range: 17° (67° to 82°)

mean: 76°

5.12.02

VOCABULARY

TERMS

mean
average
median
range

GETTING STARTED

Divide the chalkboard into three sections labeled A, B and C. Prepare a set of 30 cards with a 2-digit number written on each card. Divide the class into three teams (A, B and C). Give each player a card. The first player on each team goes to the chalkboard and writes his/her number in his/her team space. The second player adds the number written on his card to the number written on the chalkboard by his/her teammate. The third player adds his/her number to the sum of the first two numbers. The game continues until the tenth card is added. The first team to correctly add their cards is the winner. If a student finds a mistake in one of his team's examples, he is permitted to correct it before doing his own problem.

Draw the following chart on the chalkboard.
e.g.,

Example	Estimate	Answer

Write 10 division examples in the example column.
e.g.,

$7\overline{)134}$

Ask the students to divide a paper into three columns and copy the headings. Say, "Copy the examples, estimate, and solve, writing the information in the proper columns." The student whose estimates were closest to the actual answer wins the game.

5.12.02

5.12.02.01 **compute the arithmetic mean (average) to the nearest whole number**

STRATEGY 1: Prepare a set of blocks. Display the blocks as follows: a five block tower, seven block tower, two block tower and a six block tower. Say, "We are going to find the mean (average) number of blocks in each column. Let's even out the blocks." Ask a student to come up to the desk and even out the blocks. (five blocks in each tower) Say, "This is what we mean by finding the average. However, there is a faster way to find the mean or average. There are two steps in finding the mean: (1) add all of the numbers; (2) divide the sum by the number of addends.

e.g.,

$5 + 7 + 2 + 6 = 20$
$20 \div 4 = 5$

The mean or average is 5.

STRATEGY 2: Prepare pencils. Give one student 12 pencils, another 9 pencils and a third student 15 pencils. Say, "We want to find the mean or average number of pencils. First we find the total number of pencils. How do we find the total? (Add: 12 + 9 + 15) We have a total of 36 pencils. We want to distribute them evenly among the three students." Ask another student to come up and evenly distribute the pencils. Say, "A faster way to find the average or mean is to divide 36 by the number of students." Write $36 \div 3 = 12$ on the chalkboard. Say, "When we find the average or mean, we use two steps: (1) add the numbers; (2) divide the sum by the number of addends."

5.12.02

5.12.02.02 recognize that the median is the middle score when the group of scores is arranged according to size (limit to odd number of scores)

STRATEGY 1: Write the following on the chalkboard.

John's marks on his math test were
82, 60, 79, 84, and 91. What was
his median score?

Say, "Before we can solve the problem, we must understand what 'median' means. What do you think it means? (in the middle) To find the median we list the numbers in order and circle the middle number." Ask a student to come to the chalkboard and find the median. Say, "82 is the median."

Repeat this procedure using other test scores.

STRATEGY 2: Say, "Median means middle." Ask five students to come to the front of the classroom. Give each a different number of crayons, e.g., 7, 2, 4, 6, 11. Say, "Before we can find the median or middle, we must put the numbers in order." Ask the students with the crayons to place themselves in counting order based on the number of crayons each student is holding. Ask another student to go to the chalkboard and list the numbers in order. Return to the students holding the crayons. Ask the student in the middle or the "median" to step forward. Ask another student to go to the chalkboard and circle the middle or median number. (6)

Repeat this procedure with other examples varying the numbers and using 2- and 3-digit numbers.

5.12.02

5.12.02.03 **analyze collected data according to range and mean**

STRATEGY 1: Divide the class into groups of four students. Each of the groups is given a different number of blocks, e.g., 7, 11, 4, 8, 5, 2 and 5. Write mean and range on the chalkboard. Say, "Mean means average. Range means the difference between the lowest number and the highest number. Which group has the greatest number of blocks? (11) ...the least? (2) What is the difference? (9) The range of these blocks is 11 to 2 or 9. To find the mean or average, we add all of the blocks and divide by the number of groups." Ask a student to add the blocks and divide by the number of groups,

e.g.,

42 ÷ 7 = 6

STRATEGY 2: Write the following chart on the chalkboard.

e.g.,

Candy Bars Sold By P.S. 55

1st Grade	30 bars
2nd Grade	55 bars
3rd Grade	20 bars
4th Grade	40 bars
5th Grade	15 bars

Say, "What is the range of candy bars sold by the grades? What is the mean or average of the grades? Range is the span between the lowest and the highest. What is the range of candy bars sold by the different grades? (Low of 15 by the 5th Grade and a high of 55 by the 2nd Grade or 40.) To find the mean, we add all of the candy bars sold and divide by five." Ask a student to complete the problem on the chalkboard.

e.g.,

30
55
20
40
+15
160 total candy bars

$5\overline{)160}$ = 32 = mean

P.O. 5.12.02.01

NAME: ______________________________ **CLASS:** __________ **DATE:** ________

Find the average/mean of the numbers in each square. If the average is greater than 30, color the square red. If the average is less than 30 color the square blue.

18 19 12 11	64 28 80 12	37 59 41 31	24 10 13 17
48 23 71 82	5 18 12 13	17 22 33 40	56 23 38 47
25 36 25 38	19 24 12 29	34 27 32 14	59 63 28 30
23 27 32 14	25 42 63 74	26 34 49 55	34 26 15 17

P.O. 5.12.02.02

NAME:____________________ CLASS:________ DATE:________

Circle the median in each example. Write the letter of the problem above each answer.

___	___	___	A	___	___	___	___	___	___	___
19	193	14	15	5	21	193	24	16	193	132

___	___	___	___	___	___	___	___	___
16	15	173	193	16	18	78	79	21

A. 7, [✓ 15], 23

B. 13, 17, 19, 21, 27

C. 12, 9, 14, 23, 18

E. 112, 172, 193, 201, 207

H. 17, 9, 13, 19, 16

U. 2, 6, 8, 3, 5

N. 75, 82, 74, 80, 79

O. 9, 12, 18, 27, 32

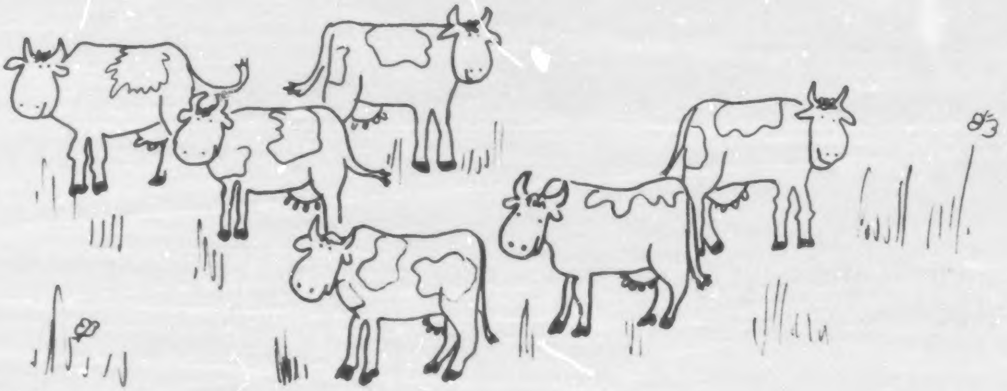
R. 70, 74, 78, 83, 85

S. 15, 12, 21, 24, 22

T. 8, 12, 24, 29, 32

V. 111, 159, 173, 182, 193

Y. 132, 147, 128



Why are cows so noisy?

P.O. 5.12.02.03

NAME: ______________________ CLASS: ________ DATE: ________

Solve the following problems.

The chart below shows the rain for the first six months of the year.

Months	Amount of Rain
January	7 inches
February	18 inches
March	14 inches
April	12 inches
May	4 inches
June	2 inches

① What was the range in the amount of rain from January to June? __________

② What was the average amount of rain from January to June? __________

③ What was the range in the amount of rain from January to March? ________

④ What was the average amount of rain from January to April? ________

Unit 31

5.01.03 ROMAN NUMERALS TO M

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.03.01C identify the Roman symbol D (500) and use it with the symbols I, V, X, L and C to write Roman numerals;
e.g.,
500 = D

5.01.03.02C identify the Roman symbol M (1,000) and use it with the symbols I, V, X, L, C and D to write Roman numerals;
e.g.,
M = 1,000 MXV = 1,015

5.01.03.03C rename a Roman numeral as its Arabic equivalent;
e.g.,
DCV = 605

5.01.03.04C rename an Arabic number as its Roman numeral equivalent.
e.g.,
1,501 = MDI

5.01.03

VOCABULARY

TERMS	SYMBOLS
500	D
1,000	M

GETTING STARTED

Prepare a set of cards with Roman numeral I, V, X, L and C and a second set of cards numbered 1, 5, 10, 50 and 100. Ask a student to hold a Roman numeral card and ask another student to find the matching number. Repeat this procedure with rest of the cards.

Write the Roman numerals I, V, X, L and C on the chalkboard. Ask a student to come to the chalkboard and write the arabic number that is represented by the Roman numeral.

Reverse the above procedure and repeat.

5.01.03

5.01.03.01 **identify the Roman symbol D (500) and use it with the symbols I, V, X, L and C to write Roman numerals**

STRATEGY 1: Write D = 500 on the chalkboard. Say, "The letter D in the Roman numeral system equals 500 in our number system. How much less than 500 is 400? What Roman numeral stands for 100?" (C) Write CD = 400 on the chalkboard. Say, "In the Roman numeral system we can never repeat a digit more than three times. Therefore, we subtract 100 from 500 to represent 400."

Repeat this procedure for adding 100 to 500 in Roman numerals. e.g., How much more is 600 than 500? Write DC = 600 on the chalkboard.

Continue the writing of Roman numerals using numbers beginning with 500 or the symbol D. Write DI on the chalkboard. Say, "This is 501. How do we write the Roman numeral for 502? ...503?" Ask a student to write the Roman numerals on the chalkboard. Say, "504 is a special kind of number because we cannot repeat any symbol 4 times." Write DIV = 504 on the chalkboard. Say, "We subtracted I from V to represent 4."

Ask the students to write various Roman numerals from DX through DCCCXCIX.

STRATEGY 2: Prepare index cards with Roman numerals from D through DCCCXCIX. You need not prepare a card for every numeral. Give each student a card. Ask ten students to come to the front of the room. Say, "Arrange yourselves in counting order." Ask the first student to step forward. Ask the seated students to write the Roman numeral that comes before and after that numeral in their notebooks.

Repeat this procedure using the other cards.

5.01.03

5.01.03.02 **identify the Roman symbol M (1,000) and use it with the symbols I, V, X, L and C to write Roman numerals**

STRATEGY 1: Write the following on the chalkboard I, V, X, L, C, D. Ask the students to identify the Roman symbols. Write DCCCXCIX on the chalkboard and ask a student to identify the number. Say, "Since we cannot write any symbol four times in a row, we use a new symbol when writing a numeral larger than 899." Write M on the chalkboard. Say, "M equals 1,000. How would we write 900?" (C before M because we subtract 100).

Ask the students to write various Roman numerals from M through MM.

STRATEGY 2: Write M on the chalkboard. Say, "The letter M in Roman numerals represents 1,000 in our number system. What Roman numeral represents 100?" (C) Write CM on the chalkboard. Say, "By placing the C in front of the M you are using the subtraction rule of Roman numerals. CM = 100 less than 1,000 or 900."

Write MC on the chalkboard and ask a student to come to the chalkboard and write the Arabic equivalent. (1,100)

Repeat this procedure for other Roman numerals from CM through MM.

5.01.03.03 **rename a Roman numeral as its Arabic equivalent**

STRATEGY 1: Write CDV on the chalkboard. Ask a student to come to the chalkboard and write the Arabic equivalent next to the Roman numeral.

5.01.03

STRATEGY 1: cont'd

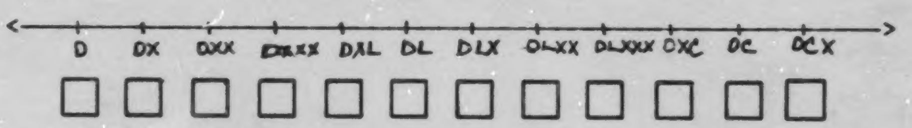
e.g.,

CDV = 405

Write a series of Roman numerals on the chalkboard and ask the students to write the equivalent Arabic numbers in their notebooks.

STRATEGY 2: Draw a number line on the chalkboard. Place the Roman numerals D through DCX on the number line.

e.g.,



Ask several students to come to the chalkboard and write the Arabic equivalent below the Roman numeral on the number line. Repeat this procedure with other Roman numerals from DC through M..

5.01.03.04 **rename an Arabic number as its Roman numeral equivalent**

STRATEGY 1: Draw the following chart on the chalkboard.

e.g.,

Arabic	Roman Numeral
1200	☐

Ask a student to write the Roman numeral in the empty box.

Repeat this procedure using other numerals.

STRATEGY 2: Write 1776 on the chalkboard. Ask a student to write the equivalent Roman numeral.

e.g.,

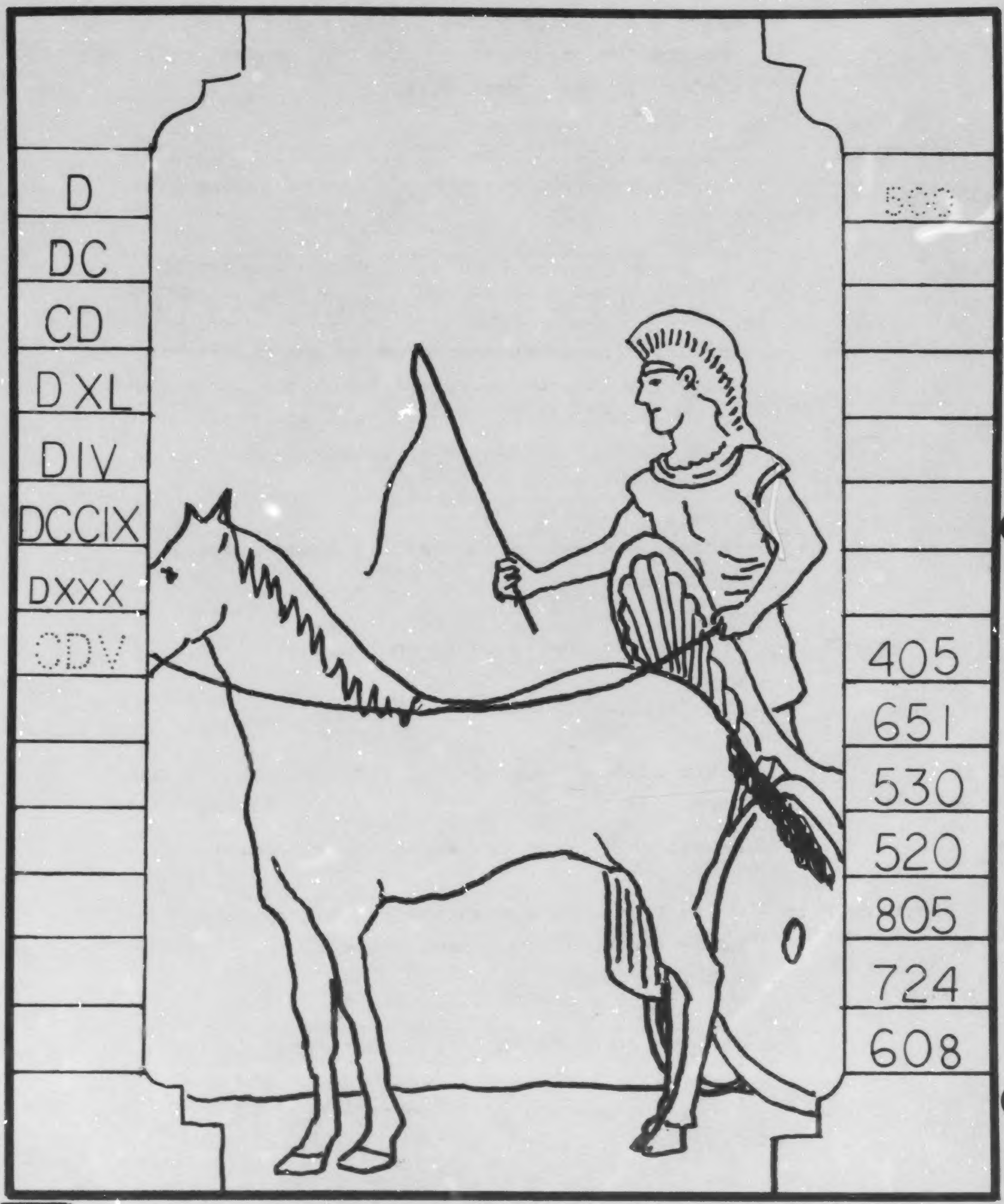
1776 = MDCCLXXVI

Ask the students to list numbers that indicate important dates in American history and write the the corresponding Roman numeral next to it.

P.O. 5.01.03.01

NAME:______________________________ CLASS:__________ DATE:________

Fill in the blanks.

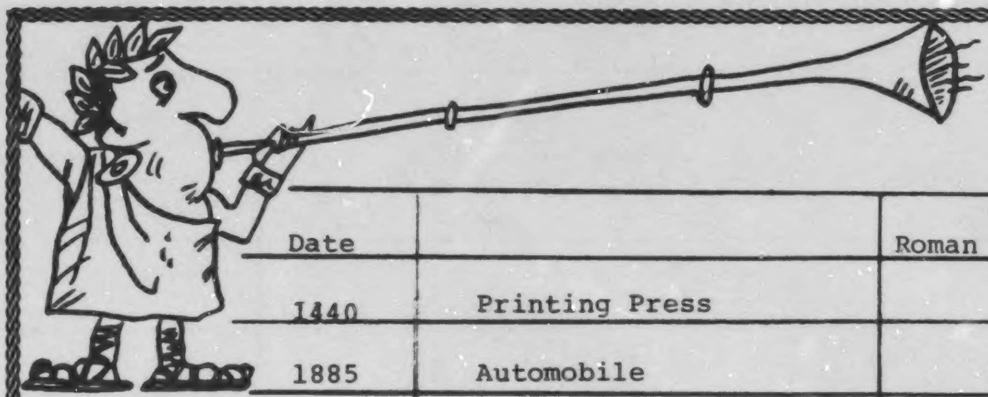


D	500
DC	
CD	
DXL	
DIV	
DCCIX	
DXXX	
CDV	405
	651
	530
	520
	805
	724
	608

P.O. 5.01.03.02

NAME: ______________________ CLASS: ________ DATE: ________

Fill in the Roman numerals.



Date		Roman numeral
1440	Printing Press	
1885	Automobile	
1903	Airplane	
1904	Radio	
1924	Television	

Date		Roman numeral
1000	North America	
1492	Columbus Discovered New World	
1520	First Trip Around The World Completed	
1620	Pligrims landed in America	
1969	First Man on Moon	

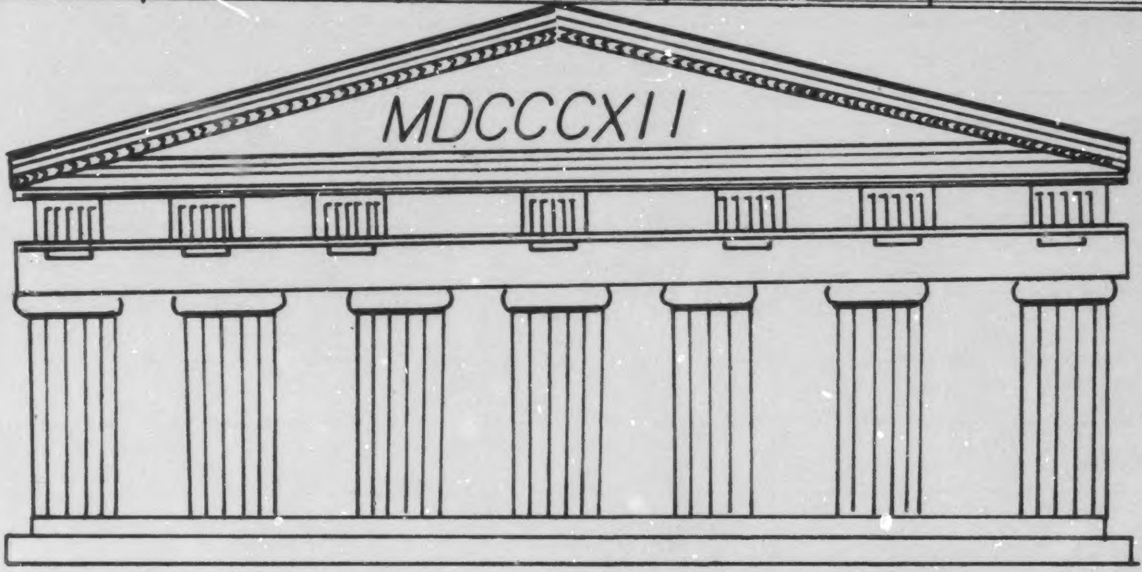
Date		Roman numeral
1776	Declaration of Independence	
1865	United States Civil War Ended	
1945	World War II Ended	
1963	President Kennedy Assassinated	
1980	President Kennedy Elected President of the U.S.	

P.O. 5.01.03.03

NAME:______________________________ CLASS:__________ DATE:________

Fill in Arabic numerals.
Write Arabic equivalents.

DC	DCC	DCIX	DCXL	DCL
MI	DCCC	DCIV	DCCLXX	MX
MD	MDCiX	MDCC	MC	MCCIV



DXL = 540
+DIV = +504

MCIX =
+MCD = +

DCIX =
+DCCI = +

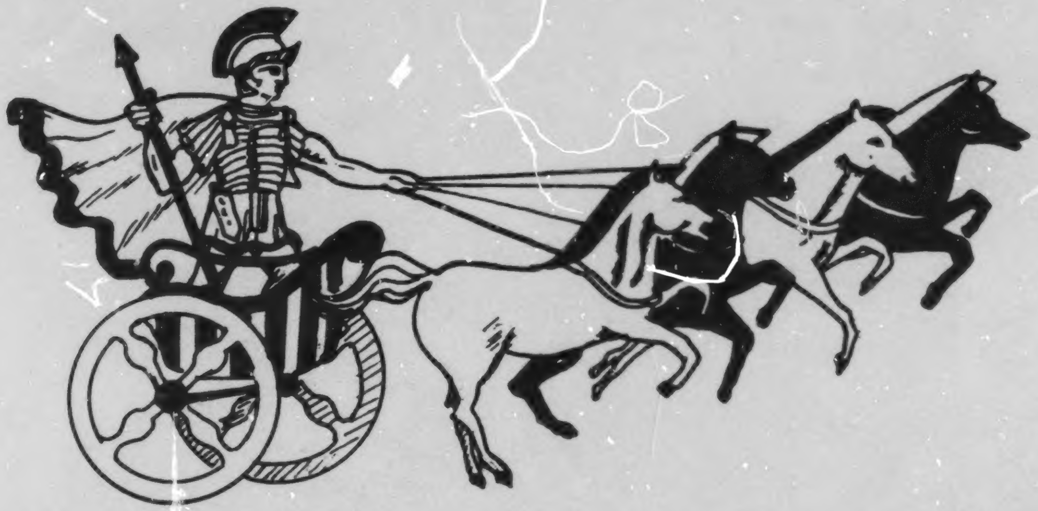
MDC =
+MDCCIX = +

P.O. 5.01.03.04

NAME: ____________ CLASS: ________ DATE: ________

A. Fill in Roman numerals.

Arabic Numeral	750	603	525	640	830	899
Roman Numeral	DCCL					
Arabic Numeral	1001	1080	1505	1640	1780	983
Roman Numeral						



- 36d -

Unit 32

5.04.04 MULTIPLICATION OF 4-DIGIT NUMBERS BY 2-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.04.04.01A multiply multiples of 1,000 by multiplies of ten;

e.g.,

$$\begin{array}{r} 1{,}000 \\ \underline{\times \quad 10} \\ 10{,}000 \end{array} \qquad \begin{array}{r} 1{,}000 \\ \underline{\times \quad 20} \\ 20{,}000 \end{array} \qquad \begin{array}{r} 3{,}000 \\ \underline{\times \quad 30} \\ 30{,}000 \end{array}$$

5.04.04.02B use the distributive property of multiplication to multiply a 4-digit number by a 2-digit number in horizontal format;

e.g.,

$$\begin{aligned} &25 \times 2481 = \\ &25 \times 2481 = (20 + 5) \times 2481 \\ &\qquad\qquad\ \ = (20 \times 2481) + (5 \times 2481) \\ &\qquad\qquad\ \ = 49{,}620 + 12{,}405 \\ &\qquad\qquad\ \ = 62{,}025 \end{aligned}$$

5.04.04.03A multiply a 4-digit number by a 2-digit number in vertical format;

e.g.,

$$\begin{array}{rl} 2{,}481 & \\ \underline{\times \quad 25} & \\ 12{,}405 & (\ 5 \times 2481) \\ 49{,}620 & (20 \times 2481) \\ 62{,}025 & (25 \times 2481) \end{array}$$

5.04.04.04A solve word problems related to skills learned in this module.

e.g.,

Our school ordered balloons for the spring fair. There are 2,485 balloons in each carton. We ordered 25 cartons of balloons. How many balloons did we receive?

$$\begin{array}{rl} 2{,}485 & \\ \underline{\times \quad 25} & \\ 12{,}425 & \\ \underline{49{,}700} & \\ 62{,}125 & \text{balloons} \end{array}$$

5.04.04

VOCABULARY

TERMS

multiplier
multiplicand
partial products
product
factor

GETTING STARTED

Prepare several 3" by 3" grids for each student.
e.g.,

x	2	20	200
2	4		
20			
200			

Instruct the students that they must multiply to fill in each box in the grid.

Students may be asked to repeat this procedure, filling in other grids using 3, 30, 300, or 4, 40, 400.

Prepare several thin strips of paper having six multiplication facts written on each.
e.g.,

6 x 3 =
4 x 0 =
3 x 9 =
2 x 5 =
7 x 8 =
1 x 1 =

Divide the class into teams. Ask the students on the same team to sit in the same row. Distribute a fact sheet to the first person on each team. He/she writes the product for the first fact, then passes the paper to the second person who fills in the product for the second fact until the last person is reached. Each team works simultaneously. The team that completes their paper first is the winner.

5.04.04.01 **multiply multiples of 1,000 by multiples of ten**

STRATEGY 1: Write the following examples on the chalkboard.

e.g.,

$$\begin{array}{r} 1{,}000 \\ \times\ \ 10 \\ \hline 10{,}000 \end{array} \qquad \begin{array}{r} 1{,}000 \\ \times\ \ 20 \\ \hline 20{,}000 \end{array}$$

Say, "We can use a shortcut to arrive at the product. Count the number of zeros in both factors and place that number of zeros in the product. Multiply the two non-zero numbers, and write this digit to the left of all the zeros."

Repeat this procedure using other numbers.

STRATEGY 2: Prepare two sets of cards, one set with multiples of 1,000 and the second set with a multiples of 10. Ask a student to select one card from each set and write the example which can be made from his/her cards on the chalkboard, e.g., $\boxed{3000}$ and $\boxed{30}$. Say, "To find the product, count all the zeros and write them in the product. Multiply the two non-zero numbers and write the product to the left of the zeros."

e.g.,

$$\begin{array}{r} 3{,}000 \\ \times\ \ 30 \\ \hline 90{,}000 \end{array}$$

Repeat this procedure using other cards.

5.04.04.02 **use the distributive property of multiplication to multiply a 4-digit number by a 2-digit number in horizontal format**

STRATEGY 1: Write 25 x 1,463 = ☐ on the chalkboard. Say, "Rewrite 25 in expanded form (20 + 5) and multiply 1,463 by 20 and 1,463 by 5." Write 25 x 1,463 = (20 x 1463) + (5 x 1,463) on the chalkboard. Ask two students to come to the chalkboard and multiply the examples.

5.04.04

STRATEGY 1: cont'd

e.g.,

$$(20 \times 1,463) + (5 \times 1,463) =$$
$$29,260 + 7,315$$

Say, "These are partial products because each is a 'part' of the final product. Add the partial products to find the final product."

e.g.,

$$\begin{array}{r} 29,260 \\ \underline{+7,315} \\ 36,575 \end{array}$$

STRATEGY 2: Prepare two sets of cards, one set with 4-digit numbers and the second set with 2-digit numbers.

e.g., $\boxed{1,345}$ $\boxed{34}$

Divide the class into two teams. Each team captain picks one card from each pile and writes the example for his team on the chalkboard.

e.g., $\dfrac{\text{Team A}}{34 \times 1345} = \boxed{}$

Ask each team to solve the example using the distributive property.

e.g.,

$$(30 \times 1345) + (4 \times 1345) =$$
$$(40,350) + (5,380) =$$
$$47,730$$

The winner is the team with the greater product.

5.04.04.03 **multiply a 4-digit number by a 2-digit number in vertical format**

STRATEGY 1: Draw a place value chart on the chalkboard. Place the following example in the chart.

e.g.,

Th	H	T	O
1	3	4	5
x		3	1

STRATEGY 1: cont'd

Say, "We multiply by 1 and by 30. We add the two partial products. We, therefore, solve the multiplication example in two steps rather than in two separate examples." Ask a student to multiply 1,345 by 1.

e.g.,

1	3	4	5
x		3	1
1	3	4	5

Ask a student to place a box around the 3 in the multiplier. Say, "Because the 3 is in the tens place, its value is 30. Place a zero in the ones place to indicate we are multiplying by a multiple of 10 and then multiply by 3."

e.g.,

	Th	H	T	O
	1	3	4	5
x			$\boxed{3}$	1
	1	3	4	5
4	0,	3	5	0
4	1,	6	9	5

Ask another student to add the two partial products. Repeat this procedure using other examples.

STRATEGY 2: Prepare a die. Ask the students to fold a sheet of paper into four boxes. In box 1 ask the students to draw the following.

e.g., ☐ ☐ ☐ ☐

x ☐ ☐

Say, "I will roll the die six times. When I read the number, place that number in any one of the six boxes. Once you write the number in the box you cannot move it to another box. After all six boxes have been filled, complete the multiplication example." Ask a student to write his/her answer on the chalkboard. Say, "Who has a product greater than this one?" Write the greatest product on the chalkboard. Repeat this procedure using other examples.

STRATEGY 2: cont'd

Note: Arrange the numbers from largest to smallest; assign a letter to each number as shown.

5	5	4	3	2	0
A	B	C	D	E	F

Arrange the algorithm as follows to obtain the greatest possible product.

$$\begin{array}{cccc} B & C & E & F \\ \times & & A & D \\ \hline \end{array}$$

5.04.04.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> The distance between Atlanta and San Francisco is 3,422 km. If a pilot flies between Atlanta and San Francisco 29 times, how many kilometers does he fly?

Say, "Multiplication is needed to solve this problem." Ask a student to write the example and solve it on the chalkboard.

e.g.,

$$\begin{array}{r} 3{,}422 \\ \times \quad 29 \\ \hline 30{,}798 \\ 68{,}440 \\ \hline 99{,}238 \end{array} \text{ km}$$

Repeat this procedure using other word problems.

STRATEGY 2: Prepare two sets of cards, 10 cards having a 4-digit number and 10 cards having a 2-digit number.

e.g.,

$\boxed{2345}$ $\boxed{37}$

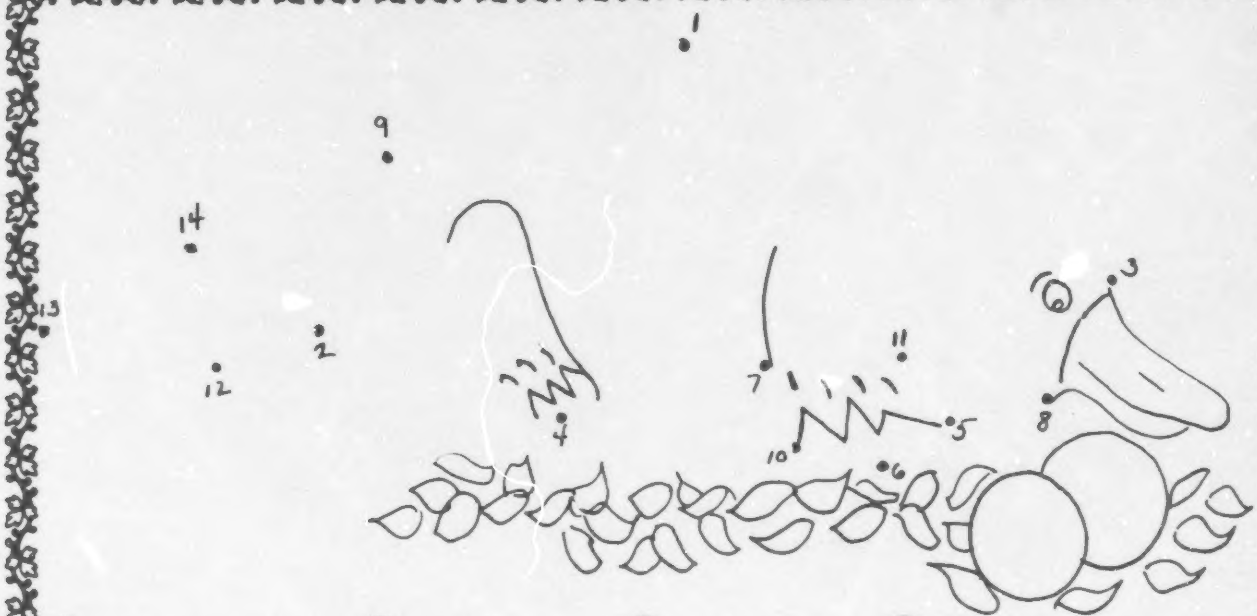
Ask a student to draw a card from each set. Ask other students to try to think of a word problem using these numbers and where multiplication is needed to solve the problem.

Ask the remaining students to solve the problem.

P.O. 5.04.04.01

NAME: ______________________________ CLASS: __________ DATE: ________

Find each product. Connect the dots by going from the example with the smallest product to the example with the greatest product.



① 2000 ×10 ______

② 4000 ×30 ______

③ 1000 ×10 ______

④ 7000 ×20 ______

⑤ 6000 ×40 ______

⑥ 3000 ×60 ______

⑦ 5000 ×30 ______

⑧ 9000 ×70 ______

⑨ 1000 ×40 ______

⑩ 4000 ×40 ______

⑪ 8000 ×50 ______

⑫ 3000 ×30 ______

⑬ 2000 ×40 ______

⑭ 7000 ×10 ______

P.O. 5.04.04.02

NAME: ______________________ CLASS: ________ DATE: ________

Use the distributive property to solve each example.

Use the distributive property to solve each example.

The first one has been done for you.

32 × 2361

(30 + 2) × 2361

(30 × 2361) + (2 × 2361)

70830 + 4732

7552

24 × 1432

(20 + 4) × 1432

(20 × ____ . 4 × ____)

________ + ________

26 × 7563

(20 + 6) × 7563

(20 × ____) + (6 × ____)

________ ________

41 × 2851

(40 + 1) × 2851

40 × ____) + (1 × ____)

________ + ________

35 × 4138

(30 + 5) × 4138

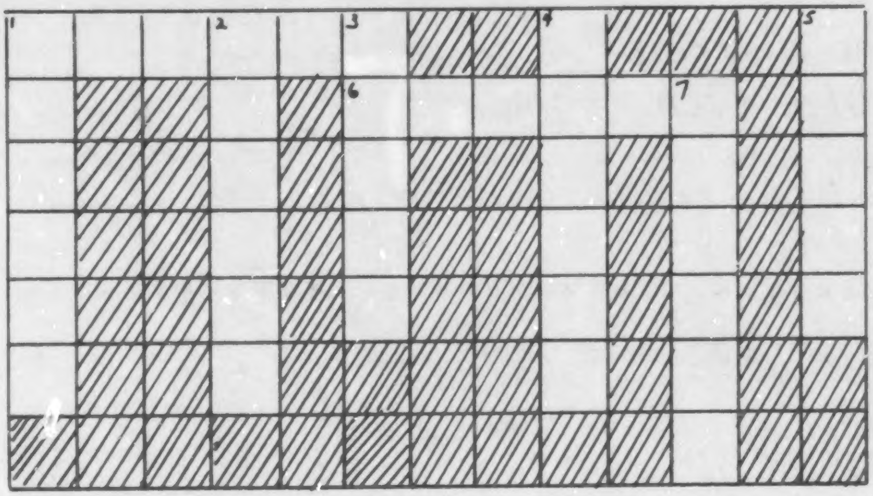
(30 × ____) + (5 × ____)

________ + ________

P.O. 5.04.04.03

NAME: ______________________ CLASS: __________ DATE: ________

Solve each problem. Use the answers to complete the puzzle.



Across

① 4203
×36

⑥ 9004
×63

Down

① 4655
×42

② 6885
×47

③ 3421
×25

④ 3068
×74

⑤ 3568
×27

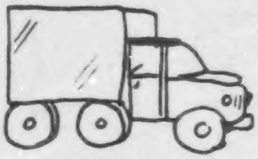
⑦ 6670
×39

P.O. 5.04.04.04

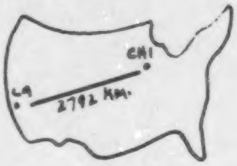
NAME:______________________________CLASS:________DATE:_______

Read each word problem. Estimate the answer, then solve. Check by thinking through your example again.

1. A truck delivers 3,246 containers of milk to the school each week. How many containers will be delivered in 34 weeks?



2. The distance between Chicago and Los Angeles is 2792 km. If you travel between these two cities 43 times, how many kilometers will you have travelled?



3. A sports arena has 25 sections of seats. Each section has 1,026 seats. How many seats in the whole arena?

NY News
Cold Wave

4. A newspaper has a circulation of 7,236 papers per day. How many papers will they print in 31 days?

GO TEAM
RAH
GO
RAH
RAY

5. A shoe factory can produce 5,248 pairs of shoes in one month. How many pairs of shoes can be produced in 12 months?

6. A pen company packs 24 pens in a box. How many pens will be in 1983 boxes?

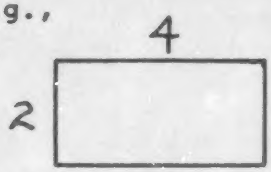
5.10.04 AREA OF A RECTANGULAR REGION

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.04.01A find the area (A) of a rectangle by multiplying length times the width; e.g.,



A = length x width
A = 2 x 4
A = 8 square units

5.10.04.02A solve word problems relating to skills learned in this module.
e.g.,

I want to buy a rug to cover the bedroom floor. The bedroom is 12 feel long and 10 feet wide. What area has to be covered?

A = length x width
A = 12' x 10'
A = 120 square feet

5.10.04

VOCABULARY

TERMS

interior
area
dimensions
exterior

GETTING STARTED

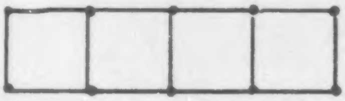
Prepare 13 cards with a 2-digit number written on each card. Divide the class into team A and B. Pick a card from the deck, e.g., $\boxed{28}$. Say, "The student who calls out the factors of 28 first wins the card for his/her team." The team with the greatest number of cards wins.

Prepare and distribute geoboards and rubber bands. Display one square unit.

e.g.,

Say, "Construct a rectangle that has four square units. Use other rubber bands to mark-off the squares in the interior."

e.g.,



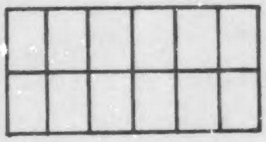
Repeat this procedure.

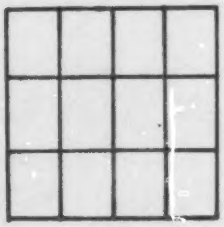
5.10.04

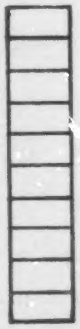
5.10.04.01 **find the area (A) of a rectangle by multiplying the length times the width**

STRATEGY 1: Prepare and distribute graph paper. Tape a sheet of graph paper to the chalkboard. Draw the following diagram.

e.g.,



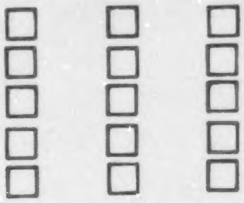




Say, "Copy the drawings and count the number of squares. When we count the inside part or the interior region of a shape we are referring to area. What is the area of drawing 1? (12) There is a faster way to find the area. Multiply the length times the width." (6 x 2 = 12) Repeat the procedure using other drawings.

STRATEGY 2: Prepare a set of centimeter blocks. Place the blocks in a 5 x 3 array.

e.g.,



Ask a student to count the blocks to find the area. Say, "What is the area of this figure? (15) There is a faster way to find area. We multiply the length times the width, 3cm x 5cm = 15cm."

Repeat this procedure using other arrays.

5.10.04.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> John wants to cover his desk with contact paper. His desk is 4 cm. wide and 7 cm. long. What is the area to be covered?

Say, "To find the area, we multiply the length times the width. Therefore, 7 cm. x 4 cm. = 28 square cm. The area to be covered is 28 square centimeters."

STRATEGY 2: Write the following problem on the chalkboard.

> The custodian must replace some tiles in our classroom. The section which must be replaced is 3 tiles wide and 6 tiles long. How many tiles does the custodian need?

Draw an outline with chalk on the floor of the rectangular region to be replaced by the custodian. Say, "Are we talking about the inside or the outside part of the rectangle? (interior region, inside) How can we find the area?" (count the number of tiles) Ask a student to count the number of tiles. (18) Say, "Is there a faster way to find the area?" (multiply the length by the width) Write the example on the chalkboard.

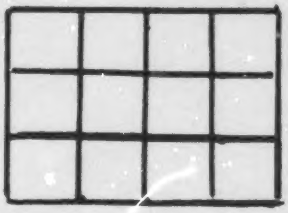
e.g.,

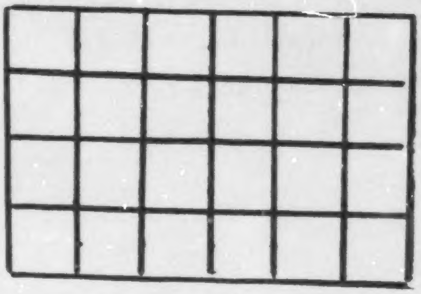
A = length x width
A = 6 x 3
A = 18 tiles

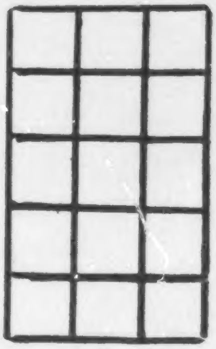
P.O. 5.10.04.01

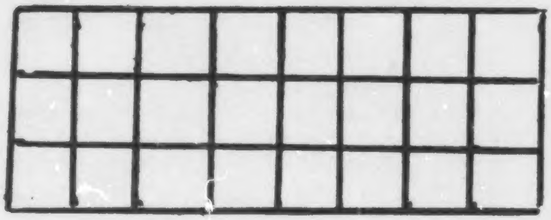
NAME:________________________ CLASS:________ DATE:________

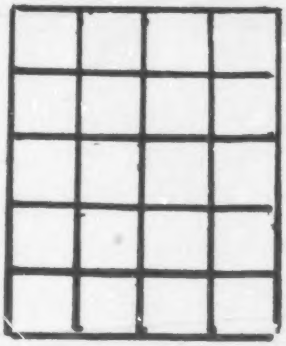
Find the area of each shape.

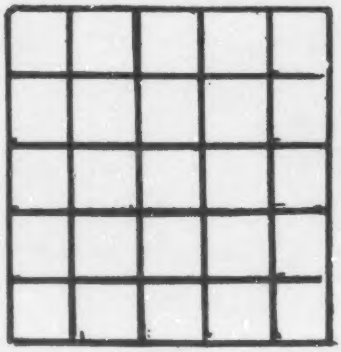












P.O. 5.10.04.02

NAME:______________________ CLASS:__________ DATE:________

Solve the following problems.

The custodian is going to re-tile our floor. If the dimensions of our room are 20 tiles by 12 tiles, how many tiles will he need?

A student's desk is 2 ft. wide and 4 ft. long. If we wish to cover it with contact paper, how much paper do we need?

A football field is 100 yards long and 30 yards wide. What is the playing area of the field?

If the area of a room is 40 square feet, what are its possible dimensions?
(4 by 10) (8 by 5) (20 by 2) (40 by 1)

Which of these are not really practical?
Why? (20 by 2) (48 by 1)

5.05.02 of DIVISION 5- and 6-DIGIT DIVIDENDS BY 2-DIGIT DIVISORS

(3-4 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.05.02.01B estimate quotients;

e.g.,

$74\overline{)8693}$; $\square \times 74 = 8693$; $8693 \div 74 = \square$

$100 \times 74 = 7400$ $7400 < 8693$

$200 \times 74 = 14,800$ $14,8000 > 8693$

Therefore, $\square > 100$ and $\square < 200$

5.05.02.02A divide 5- and 6-digit numbers by a 2-digit number and check;

e.g.,

$$\begin{array}{rr@{\qquad}r}
 & \underline{117r35} & \underline{\text{check}} \\
 & 74\overline{)8693} & 117 \\
(100 \times 74) & \underline{-7400} & \underline{\times\ 74} \\
 & 1293 & 468 \\
(10 \times 74) & \underline{-\ 740} & \underline{8190} \\
 & 553 & 8658 \\
(7 \times 74) & \underline{-\ 518} & \underline{+\ \ 35} \\
 & 35 & 8693
\end{array}$$

5.05.02.03A solve word problems related to skills learned in this module.

e.g.,

R.I.F. gave 8,693 books to Happy Town High School. There are 74 classes in this school. How many books did each class get? Will there be any left for the library?

$$\begin{array}{rr@{\qquad}r}
 & \underline{117r35} & \underline{\text{check}} \\
 & 74\overline{)8693} & 117 \\
100 \times 74 & \underline{-7400} & \underline{\times 74} \\
 & 1293 & 468 \\
10 \times 74 & \underline{-740} & \underline{+8190} \\
 & 553 & 8658 \\
7 \times 74 & \underline{-518} & \underline{+\ \ 35} \\
 & 35 & 8693
\end{array}$$

Each class received 117 books. The library received 35 books.

5.05.02

VOCABULARY

TERMS	**SYMBOLS**
divisor dividend quotient	

GETTING STARTED

Prepare and distribute Bingo Cards with division written in each box. Try to use facts with different quotients on each card. e.g.,

$3\overline{)27}$	$6\overline{)12}$	$9\overline{)72}$
$7\overline{)21}$	$6\overline{)42}$	$8\overline{)32}$
$9\overline{)\ 9}$	$3\overline{)18}$	$3\overline{)25}$

Play "Division Bingo".

Say, "I will call out a number. If that number is the quotient of one of your examples, cover that space. The first student to get three in a row is the winner." e.g., Say, "Three, the student covers $7\overline{)21}$.

Continue the game for two or three rounds.

Divide the class into two teams. Write the same division example using a 2-digit divisor and a 3-digit dividend on the chalkboard twice.
e.g.,

$21\overline{)667}$ $21\overline{)667}$

Ask a student from each team to come to the chalkboard and find the quotient. The first student to answer correctly wins a point for his team. Play continues until one team has ten points.

5.05.02

5.05.02.01 **estimate quotients**

STRATEGY 1: Say, "A concert hall can seat 87,364 people. There are 32 seats in each row. About how many rows of seats are there in the concert hall? We do not want to know the exact number of rows. We want to find the approximate number of rows or estimate the number of rows in the concert hall." Write $32\overline{)87{,}364}$ on the chalkboard. Say, "How many digits will be in the quotient?" (4) Ask the students to multiply the divisor by one thousand. (32,000) Say, "Is 32,000 greater than or less than 87,364? (less) Try 2,000 x 32. (64,000) Is this greater or less than 87,364? (less) Try 3,000 x 32. (96,000) Is this greater or less? (greater) We know our answer will be greater than 2,000 but less than 3,000." Write the following on the chalkboard.

e.g.,

$87{,}364 \div 32 =$

$\square > 2000$ and $\square < 3000$

Repeat this procedure with 5- and 6-digit divisors.

STRATEGY 2: Write $62\overline{)64{,}326}$ on the chalkboard. Say, "Rounding numbers helps us to estimate." Point to the example on the chalkboard. Say, "Round the divisor to the nearest ten and the dividend to the nearest ten thousand." Rewrite the example on the chalkboard.

e.g.,

$60\overline{)60{,}000}$

Say, "How many groups of 60 are in 60,000? (1,000) When we round numbers to estimate, we get an idea of what the answer will be." Repeat this procedure using 5- and 6-digit dividends.

5.05.02

5.05.02.02 **divide 5- and 6-digit numbers by a 2-digit number and check**

STRATEGY 1: Write $74\overline{)86,936}$ on the chalkboard. Ask a student to estimate the quotient to the nearest thousand.

e.g.,

$74 \times 1,000 = 74,000$
$74 \times 2,000 = 148,000$
$\square > 1,000$ but $\square < 2,000$.

Say, "We know that the quotient will be at least 1,000." Write the following on the chalkboard.

e.g.,

$$\begin{array}{lr} & 1 \\ & 74\overline{)86,936} \\ (1000 \times 74) & -74,000 \\ \cline{2-2} & 12,936 \end{array}$$

Ask a student to complete the subtraction at the chalkboard. Say, "About how many groups of 74 are in 12,936? (100) Multiply the divisor by 100 and place the digit 1 in the hundreds place."

e.g.,

$$\begin{array}{lr} & 1,1 \\ & \overline{)86,936} \\ 1000 \times 74 & -74,000 \\ \cline{2-2} & 12,936 \\ 100 \times 74 & -\ 7,400 \\ \cline{2-2} & 5,536 \end{array}$$

Ask a student to complete the subtraction. Say, "How many groups of 74 are in 5536?" Ask a student to fill in the think box.

e.g.,

$10 \times 74 = 740 < 5536$ $\quad$ $20 \times 74 = 1480 < 5536$

Repeat this procedure through 8 tens. Say, "What digit will be in the tens place?" (7) Multiply the divisor by 70 and place the digit 7 in the tens place.

5.05.02

STRATEGY 1: cont'd

```
                  117
Write   74)86,936  on the chalkboard.
(1000x74)  74,000
           12,936
 (100x74)  -7,400
            5,536
  (70x74)   5,180
              436
```

Ask a student to complete the subtraction. Say, "Find the digit for the ones place using the think box method."

e.g.,

74 x 1 = 74 < 356, 74 x 2 = 148 < 356

Repeat this procedure through 5 x 74. Say, "Place a 4 in the ones place and subtract to complete the example. To check, multiply the quotient by the divisor and add the remainder." Repeat this procedure using other 2-digit divisors, 5- or 6-digit dividends and check.

STRATEGY 2: Adapt Strategy 1 used in P.O. 5.05.01.02 for 5- and 6-digit numbers.

5.05.02.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard.

e.g.,

> R.I.F. gave 8,693 books to the Happy Town High School. There are 74 classes in this school. How many books did each class get?

Ask the student to guess the solution. Write several guesses on the chalkboard. Say, "Identify the relevant information, choose the correct operation and write the example needed to solve the problem."

STRATEGY 1:
cont'd

Ask the students to estimate the answer. Compare estimates to "guesstimates" and eliminate inappropriate "guesstimates." Say, "Find the quotient and check your answer. The remainder (left-over books) will be given to the library." Elicit the amount of books each class will receive (117), and how many the library will receive. (35)

STRATEGY 2:

Prepare and distribute slips of paper labeled as shown.

e.g.,

Front

CAR LOAN
Amount to be borrowed:
Number of monthly payments:

Back

Amount of Monthly Payments
Guesstimate:
Estimate:
Exact amount of monthly payments

Note: The amount borrowed should be a 5- or 6-digit whole dollar amount, e.g., $8,465. To avoid confusion use divisors and dividends that compute without remainders.

Say, "Pretend you are 21 years old and need a car loan. You receive a slip of paper telling you how much money you can borrow and how many monthly payments you must make to repay the loan. Guess the amount of money each monthly payment might be and note your guess next to "guesstimation." Estimate the amount of each monthly payment. Write the estimate in the given space. Divide and check. Write that amount next to Amount of monthly payment."

P.O. 5.05.02.01

NAME:______________________________ CLASS:________ DATE:______

Estimate each quotient to the nearest hundred without going over the dividend.

Here's How

$23\overline{)3{,}207}$

100 × 23 = 2300

200 × 23 = 4600 → too high

Answer:

The quotient is >100 and <200.

$45\overline{)9{,}206}$

The quotient is >_____ and <_____.

$37\overline{)8{,}742}$

The quotient is >_____ and <_____.

$16\overline{)7{,}532}$

The quotient is >_____ and <_____.

$29\overline{)21{,}588}$

The quotient is >_____ and <_____.

$76\overline{)23{,}948}$

The quotient is >_____ and <_____.

$32\overline{)14{,}822}$

The quotient is >_____ and <_____.

$57\overline{)10{,}000}$

The quotient is >_____ and <_____.

P.O. 5.05.02.02

NAME: ____________________ CLASS: __________ DATE: ________

Find each quotient and check.

32)5,520

100×32→3,200

2,320

70×32→2,240

80

2×32→64

16

CHECK

172

× 32

344

5160

5504

+ 16

5520

24)4593

CHECK

36)7237

CHECK

16)8,107

CHECK

)1,187

CHECK

23)45,198

CHECK

45)57,935

CHECK

P.O. 5.05.02.03

NAME:____________________________CLASS:________DATE:________

Solve.

1. A local sports stadium seats 23,468 people. There are 25 seats in each row. How many rows are there?

2. The Happy School raised $11,872 for UNICEF. If each of the 56 classes in the school raised the same amount of money. How much did each class raise?

3. A coal truck needs to deliver 121,500 pounds of coal to 15 schools. How much coal is delivered to each school?

ACE
TRUCKING

4. The ABC Company has 36 workers. Each worker earns the same amount of money. The total amount of their payroll for 1 week was 12,600. How much did eachworker get paid?

Unit 35

5.13.03 PROBLEM SOLVING: MISSING INFORMATION

PERFORMANCE OBJECTIVES

The student will be able to...

5.13.03.01A determine whether sufficient information exists to solve a problem;
e.g.,

> After making a down payment, Joe's new car will cost $150 a month for 18 months. How much will it cost altogether?

5.13.03.02A supply reasonable missing information to help solve a problem.
e.g.,

> Stephen had lunch at VIP'S. He had a hamburger for $1.45, french fries for $.79 and a soda. How much did he spend?

GETTING STARTED

Play "Guess My Number." Say, "I am thinking of a number between one and one hundred. What is my number?" Encourage students to guess the number. No matter what number they choose, tell them it is incorrect.

Select a fairy tale with which the students are all familiar. Say, "I am going to tell you a story. Listen carefully and be prepared to tell what is wrong with the story." Tell the story leaving out one or two important parts. Encourage the students to relate the missing parts of the story.

5.13.03

5.13.03.01 **determine whether sufficient information exists to solve a problem**

STRATEGY 1: Write the following problem on the chalkboard.

> After making a down payment, Joe's new
> car will cost $150 a month for 18 months.
> How much will it cost altogether?

Say, "How will we solve this problem? We cannot solve it because there is missing information. What information is missing?" (What the down payment was.) Repeat this procedure using other word problems with missing information.

STRATEGY 2: Say, "Maria and Cathy are in the same class at school. Maria asked Cathy to come to her house on Saturday. Maria said, 'I just moved to a new house.' Can Cathy go to Maria's house?" (No, because Cathy does not know where Maria lives.) Repeat this procedure using other word problems.

5.13.03.02 **supply reasonable missing information to help solve a problem**

STRATEGY 1: Write the following problem on the chalkboard.

> Billy went shopping for his mother. He bought
> bread for $.79, milk for $.63, and juice for
> $1.29. How much change did he get?

Say, "How do we solve this problem?" (The problem cannot be solved because there is missing information.) What do we need to know in order to solve this problem?" (How much money Billy's mother gave him.) Say, "How much money do you think Billy's mother gave him?" (A reasonable amount would be $5 or $10.) Ask the students to solve the problem using both $5 and $10. Repeat this procedure using other problems.

STRATEGY 2: Adapt Strategy 1 used in P.O. 5.13.03.01.

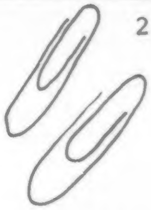
P.O. 5.13.03.01

NAME:____CLASS:_________DATE:________

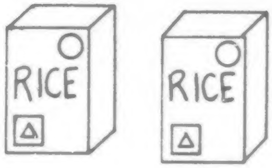
Read each problem. Decide if there is enough information to solve the problem. If there is enough information solve the problem.

Potato Chips

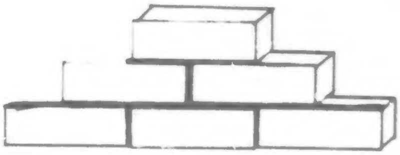
1. Mr. Green ordered 120 cases of potato chips. Each case contains 24 bags of chips. How many bags did he order?



2. A group of students made a paper clip chain. The chain was 12 feet long. How many clips did they use?



3. The school cook made rice for lunch. Each box of rice serves 24 students. How many boxes of rice did she use?



4. Mr. Smith has a rectangular garden. He placed 25 bricks along one side and 10 bricks along the second side. How many bricks does he need to enclose the whole garden?

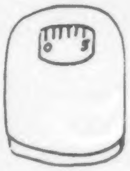
5. The Delicious Apple Company uses 2 bushels of apples to make 5 gallons of cider. How many apples did they use for 5 gallons of cider?

P.O. 5.13.03.02

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Supply the missing information on the lines and then solve the problem.

Work Space



1. Keith weighs 72 pounds. How much more does his brother weigh?

____

____

2. Joan likes to jog. She jogs every day. How many miles does she jog in 10 days?

____

____

3. Maria has 50 granola bars. She wants to share them with her friends. How many will each one get?

____

____

4. A new dress costs $12.00. How much more money does Marisol need before she can buy the dress?

____

____

5. Bobby has a job baby sitting. If he sits for 3 hours a week, how much money will he earn in 4 weeks?

____

____

5.09.04 CIRCLES

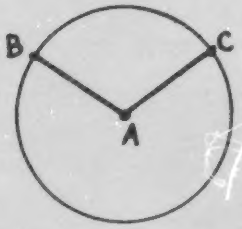
(1 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.09.04.01B identify the central angle of a circle as an angle with its vertex at the center of the circle;

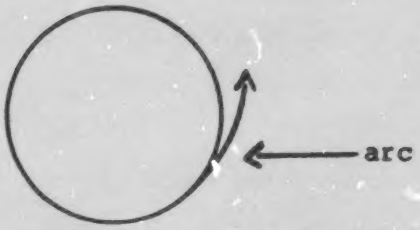
e.g.,



BAC is a central angle.
A is the center of the circle

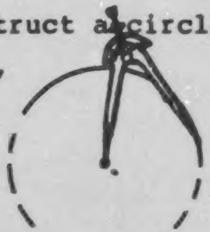
5.09.04.02B identify the arc of a circle;

e.g.,



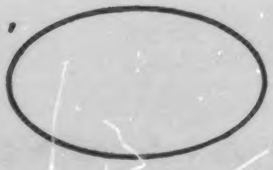
5.09.04.03B construct a circle using a compass.

e.g.,



5.09.04.04B identify an ellipse.

e.g.,



5.09.04

VOCABULARY

TERMS

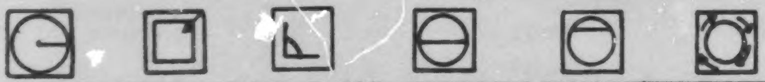
radius
chord
diameter
circumference
vertex
angle
ellipse

GETTING STARTED

Prepare twelve cards. Six cards labelled with the following terms: radius, chord, diameter, circumference, vertex and angle, and six cards with matching pictures.

e.g.,

Set A

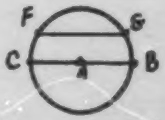


Set B Radius Vertex Angle Diameter Chord Circumference

Place the cards face down in two piles. Ask a student to select a card from Set A. Say, "What is the picture?" If the picture is correctly identified, ask the student to choose a card from Set B. If B matches A, the student goes again. If B does not match A, the cards are returned to the pack and another student is selected to have a turn.

Prepare and distribute circles for students to trace. Say, "Mark the center of the circle with a point and label it A." Ask the students to mark a point on the circumference of the circle and label that point B. Say, "Draw a line from point A to point B. What is this line segment called?" (radius) Ask the students to extend AB so that it touches the other side of the circle and label the point C. Say, "What do we call BC?" (diameter) Ask the students to draw a straight line that goes from one point on the circumference to another, but does not go through the center. Label the two points F and G. Say, "What is FG?" (a chord)

e.g.,



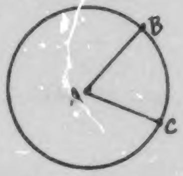
98

5.09.04

5.09.04.01 **identify the central angle of a circle as an angle with its vertex at the center of the circle**

STRATEGY 1: Prepare and distribute circles. Say, "Mark the center of the circle with a point and label it A. Mark another point anywhere on the circumference and label it B. Draw a line from point A to point B. Mark another point anywhere on the circle and label it point C. Draw a line from point A to point C."

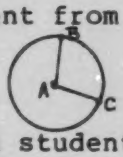
e.g.,



Say, "AB and AC form an angle. What is the name of this angle?" (BAC) Ask a student to identify the vertex of ∢BAC (point A). Say, " ∢BAC is called the central angle of circle A because its vertex is at the center of the circle." Ask the students to draw other circles and identify the central angle.

STRATEGY 2: Draw a circle on the chalkboard. Label point A in the center of the circle. Name any point on the circumference of the circle, point B. Draw a line segment from point A to point B.

e.g.,



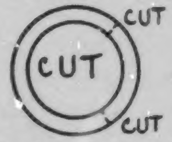
Ask a student to label point C anywhere on the circumference and draw line segment AC. Say, "Angle CAB is the central angle of this circle." Ask the students to label different points on the circle and name the central angle.

5.09.04.02 **identify the arc of a circle**

STRATEGY 1: Prepare and distribute circles to each student. Prepare the circles using the following method. Draw a circle with a diameter of six inches.

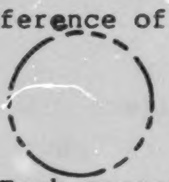
STRATEGY 1: cont'd

Draw another circle with a diameter of four inches inside the first circle. Cut cut the innermost circle and discard.
e.g.,



Ask the students to cut off a segment of the circle. Say, "The segment that was cut is called the arc of the circle." Ask the students to replace the arc to complete the circle. Say, "Cut off two more segments of the circle and replace them to form the original circle."

STRATEGY 2: Prepare and distribute drawing paper, a paper cup, a black and a red crayon to each student. Say, "Trace the mouth of the cup on the drawing paper." Using both color crayons, alternate coloring segments of the circumference of the circle in red and black.
e.g.,



Say, "Each segment of the circle is called an arc."

5.09.04.03 **construct a circle using a compass**

STRATEGY 1: Prepare and distribute compasses and paper. Say, "Spread the compass to 4 cm. Place the point of the compass in the center of the paper. The spot where the point rests is the center of the circle. Hold the compass with one hand and rotate the end of the compass which holds the pencil. Construct other circles with different radii."

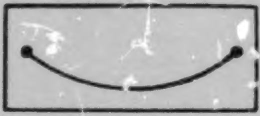
5.09.04.04 **identify an ellipse**

STRATEGY 1: Prepare and distribute to each student, a 5x7 sheet of oak tag, two paper fasteners, string and a compass. Say, "On a blank sheet of oak tag draw a 3 inch line.

STRATEGY 1: cont'd

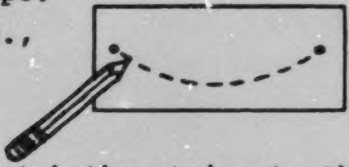
Push the two paper fasteners through the end points of the line and loosely attach a string." Demonstrate each step.

e.g.,



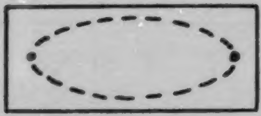
Say, "Stretch the string with a pencil and trace the shape.

e.g.,



Stretch the string to the top of the oak tag and draw the other half of the shape." Give students time to duplicate each step.

e.g.,



Say, "This is an ellipse." Ask the students to identify ellipses in the environment, e.g., football, eyes, lips. Say, "An ellipse is a geometrical figure. It is a simple closed curve of oval shape."

STRATEGY 2: Draw a circle on the chalkboard. Next to the circle draw an ellipse. Label them figure A and figure B.

e.g.,

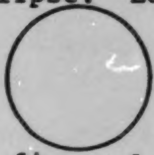


figure A

figure B

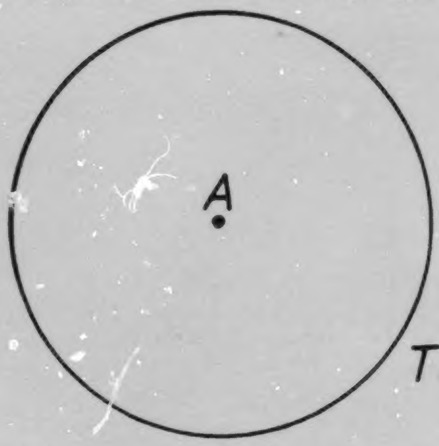
Ask a student to identify figure A. Ask if anyone knows the name for figure B. Say, "Figure B is called an ellipse." Ask students to name items with which they are familiar that suggest an ellipse, e.g., football, eye, lips, a bow when the string is stretched.

P.O. 5.09.04.01

NAME:______________________________ CLASS:________ DATE:_______

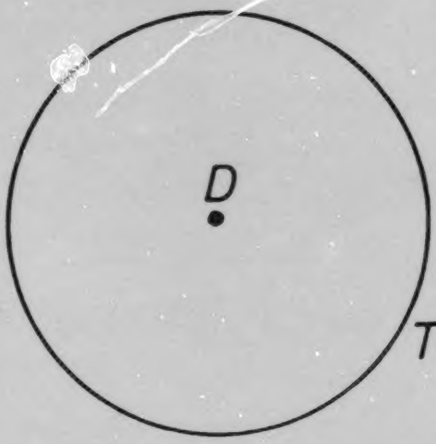
For each circle draw a central angle and label it.

1.



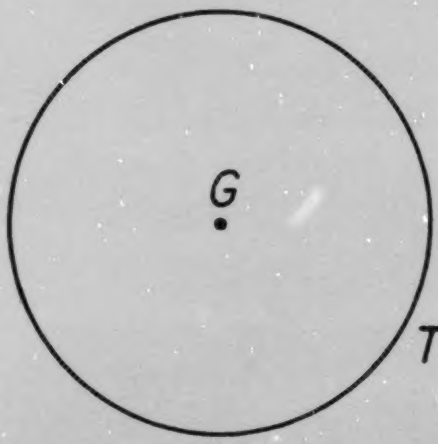
The central angle is ______

2.



The central angle is ______

3.

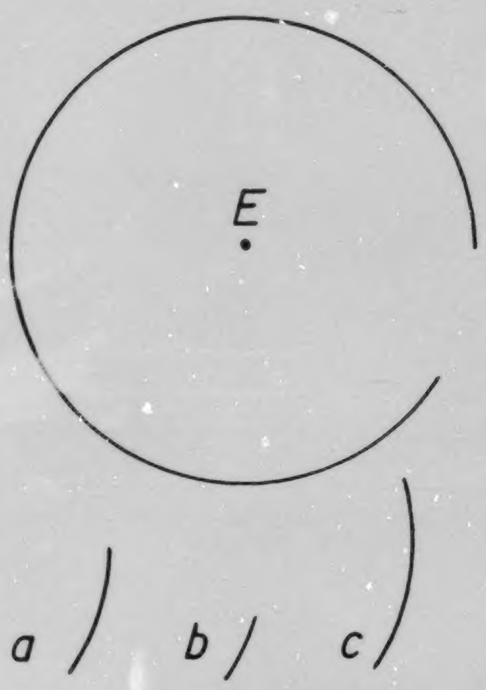


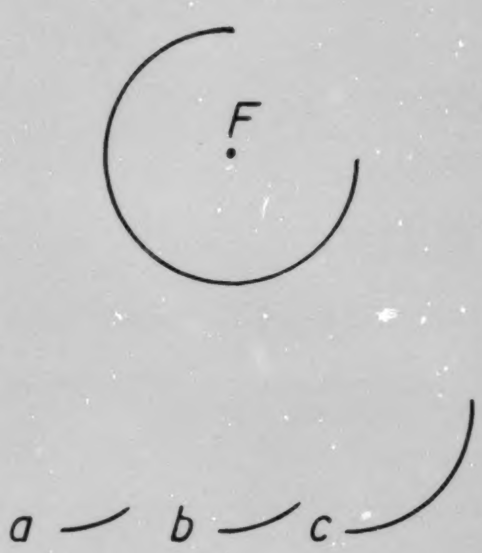
The central angle is ______

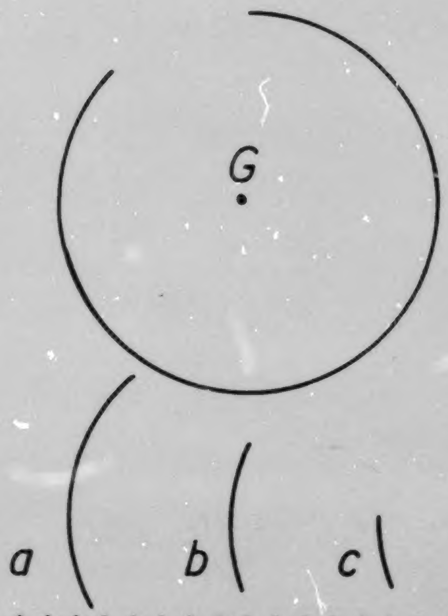
P.O. 5.09.04.02

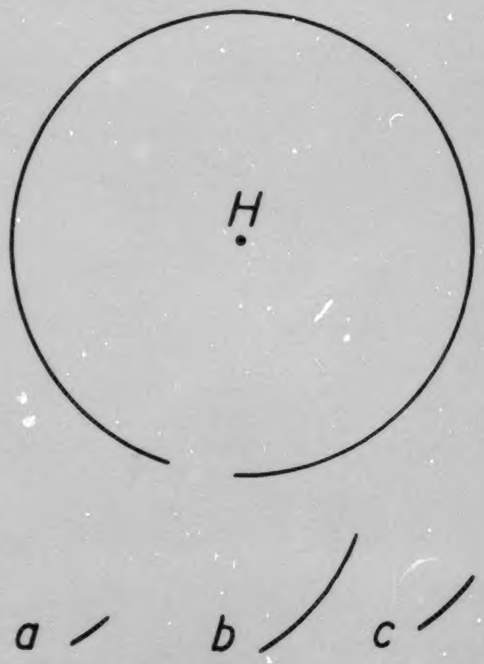
NAME: ____________________ CLASS; ______ DATE: ______

Choose the arc that would fit each given circle.









P.O. 5.09.04.03

NAME: ______________________ CLASS: ________ DATE: _______

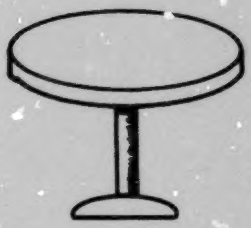
Use your compass to draw 5 intersecting circles.

P.O. 5.09.04.04

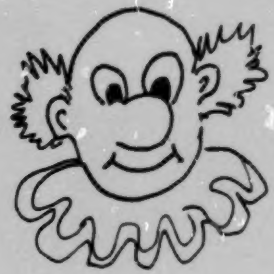
NAME: ______________________ CLASS: __________ DATE: ________

Color, the items whose shapes can be called an ellipse.

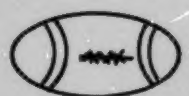
A



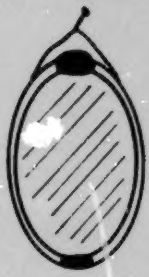
B



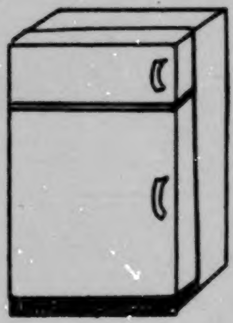
C



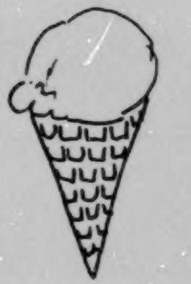
D



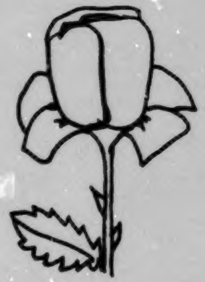
E



F



G



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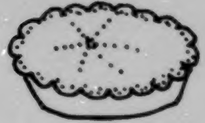

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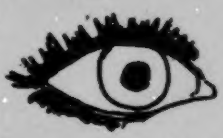
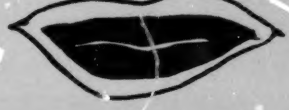


J



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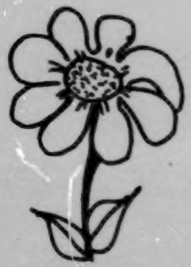

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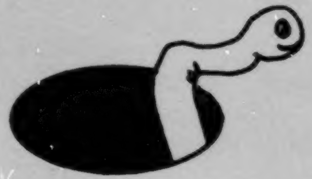


5.12.03 CIRCLE GRAPHS

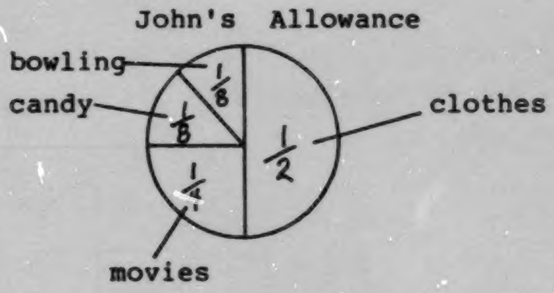
(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.12.03.01A interpret circle graphs when the sectors represent fractional numbers with unlike denominators;

e.g.,



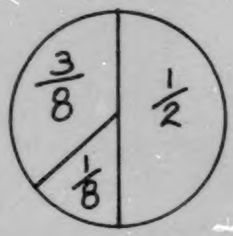
What part of John's allowance does he spend on bowling?

John spends $\frac{1}{8}$ of his allowance on bowling.

*5.12.03.02A construct circle graphs where the sectors represent fractional numbers with unlike denominators.

e.g.,

$\frac{1}{8}$, $\frac{1}{2}$, $\frac{3}{8}$



5.12.03

VOCABULARY

TERMS

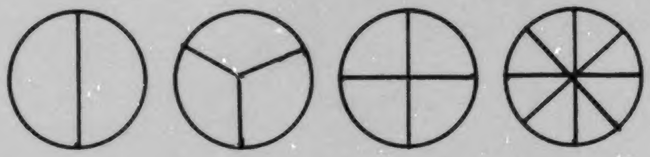
circle graph
fractional part

GETTING STARTED

Display various types of graphs, e.g., pictograph, line graph, bar graph. Ask the students to name the graphs. Discuss the reasons for constructing graphs.

Draw several large circles on the chalkboard. Select students to come to the chalkboard to divide the circles into various fractional parts.

e.g.,



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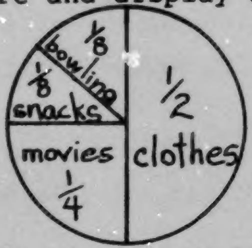
5.12.03

5.12.03.01 **interpret circle graphs when the sectors represent fractional numbers with unlike denominators**

STRATEGY 1: Prepare and display a large circle graph.

e.g.,



Say, "A circle graph is used to compare parts of the whole. The circle represents John's allowance. What part of his allowance does John spend on clothes?" Point to the graph and ask the students to find the area marked clothes. Repeat this procedure for the other parts of John's allowance. Refer to the graph and ask other questions, e.g., Does John spend more on bowling or the movies?

STRATEGY 2: Prepare and display a large circle made out of oak tag and fractional parts ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{8}$) made out of different colored construction paper. Label each fraction. Write the following on the chalkboard.

> John spends his allowance in the following way. He spends $\frac{1}{2}$ for clothing, $\frac{1}{4}$ for movies, $\frac{1}{8}$ for snacks, and $\frac{1}{8}$ for bowling.

Say, "The circle represents all of John's allowance. We are going to divide the circle to show how John spends his allowance. How much of John's allowance is spent on clothing?" ($\frac{1}{2}$) Ask a student to choose the fractional part which represents $\frac{1}{2}$, tape it on the oak tag circle and label it clothing. Repeat this procedure for the other items.

Say, "The circle represents John's allowance. Each fraction represents how much of John's allowance is spent on a particular item."

5.12.03

5.12.03.02 construct circle graphs where the sectors represent fractional numbers with unlike denominators

STRATEGY 1: Prepare and distribute sheets of paper with a large circle drawn on each. Write the following on the chalkboard.

> Alex likes to budget his money. He spends $\frac{1}{4}$ of his pay on entertainment. He saves $\frac{3}{8}$ of his pay. He spends $\frac{1}{4}$ on clothing and $\frac{1}{8}$ on snacks.

Say, "We will make a circle graph to represent Alex's budget." Above the circle write, Alex's Budget. Say, "How much of Alex's earnings is spent on entertainment?" ($\frac{1}{4}$) Label $\frac{1}{4}$ of the circle entertainment. Repeat this procedure for each category of Alex's budget.

STRATEGY 2: Prepare and distribute an oak tag circle and construction paper fractional pieces in three different sizes ($\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{10}$). Write the following on the chalkboard.

> $\frac{1}{2}$ of the students at P.S. 105 walk to school. $\frac{2}{5}$ of the students come to school by bus and $\frac{1}{10}$ of the students come to school by car.

Say, "We are going to construct a circle graph to represent this information. The circle is the graph. The pieces of construction paper represent the data. What fraction of children walk to school? ($\frac{1}{2}$) Label the half circle 'Students Who Walk to School' and paste it on the oak tag circle."

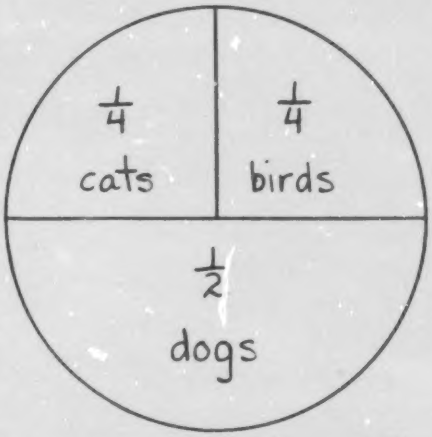
Complete the graph, repeating the procedure.

P.O. 5.12.03.01

NAME: ______________________________ **CLASS:** ________ **DATE:** ________

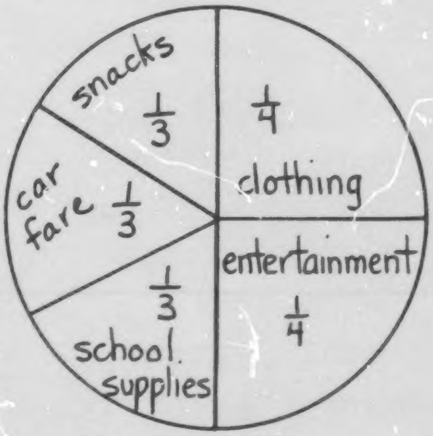
Answer the questions based on the information given on each circle graph.

Favorite Pets of Class 507



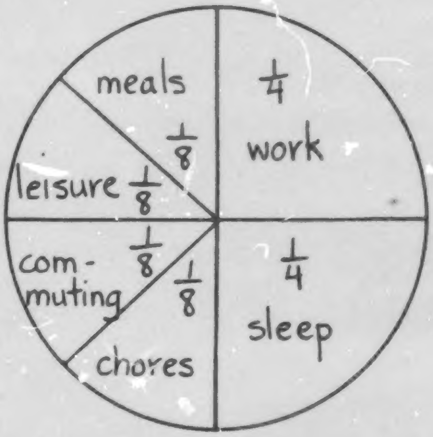
1. How many kinds of pets are represented in this circle graph? ________
2. Which pet is favored by the largest number of students? ________
3. Which pets are favored by the same number of students? ________________
4. What fraction of students chose dogs as their favorite pet? ________

Jerome's Allowance



1. What fraction of Jerome's allowance is spent on clothing? ________
2. What fraction of Jerome's allowance is spent on school supplies? ________
3. What does Jerome spend more money for?
   entertainment ☐ car fare ☐
4. How much of Jerome's allowance is spent on clothing and entertainment? ________

Time Spent in a Day



1. How many categories is the graph divided into? ________
2. What fraction of the day is spent on meals? ________
3. What two activities take up $\frac{1}{2}$ of the day? ________________
4. What fraction of the day is spent on chores? ________

P.O. 5.12.03.02

NAME: ______________________ CLASS: ________ DATE: _______

Construct a circle graph to represent the given information. You may color each segment of the graph a different color.

School Budget

$\frac{1}{2}$ - staff salaries

$\frac{1}{4}$ - books and supplies

$\frac{1}{8}$ - maintenance

$\frac{1}{8}$ - extra activities

Household Budget

$\frac{1}{4}$ - rent

$\frac{1}{4}$ - food

$\frac{2}{5}$ - utility bills

$\frac{1}{10}$ - maintenance

Unit 38

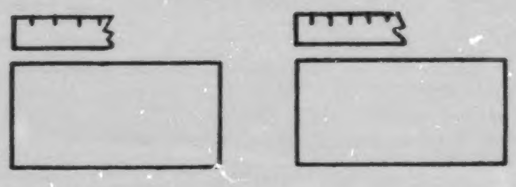
5.09.05 CONGRUENT AND SIMILAR FIGURES

(1-2 lessons)

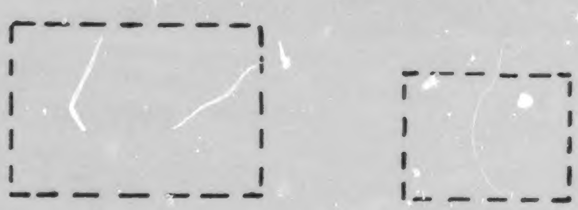
PERFORMANCE OBJECTIVES

The student will be able to...

5.09.05.01B recognize and construct congruent segments, angles and figures using a compass, protractor or ruler; e.g.,



5.09.05.02B recognize and construct similar figures. e.g.,



5.09.05

VOCABULARY

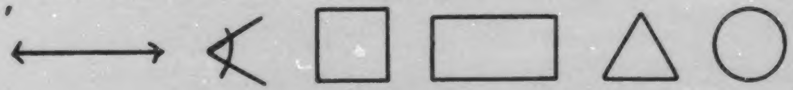
TERMS

congruent
similar

GETTING STARTED

Draw the following on the chalkboard.

e.g.,



Ask the students to identify each drawing. Say, "What instruments are used to construct, draw and/or measure these figures?" (ruler, compass, protractor) Display each instrument.

Prepare and distribute rulers, compasses and protractors to each student. Ask the students to construct a square and a rectangle. Give the students the measurements and ask the students which instrument they would use.

Repeat this procedure and utilize it to include construction of a triangle and a circle.

5.09.05

5.09.05.01 **recognize and construct congruent segments, angles and figures using a compass, protractor or ruler**

STRATEGY 1: Prepare and distribute rulers. Draw the following on the chalkboard.

e.g.,

A <-----------> B C <-----------> D

Say, "Which line segment do you think is longer $\overleftrightarrow{AB}$ or $\overleftrightarrow{CD}$? How can we find the length of each segment?" (Each segment can be measured with a ruler.) Ask a student to measure each segment. Say, "$\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are equal in length."

Ask the students to use their rulers to construct two equal line segments. Say, "When two line segments, angles, or figures are equal in size they are called congruent. We will construct two congruent angles." Ask the students to draw a ray and label it JK.

e.g.,

Say, "Place the center mark of the protractor on point J. Line up the protractor so that the zero mark is in line with $\overrightarrow{JK}$. Find 90° on the protractor. Mark a point at 90° and label it L. Draw $\overrightarrow{JL}$. We have drawn $\angle LJK$. Now draw another angle that is congruent. They must have the same number of degrees."

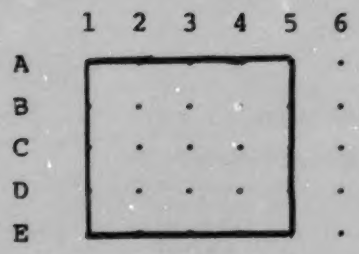
Ask the students to use their compasses to construct congruent circles.

STRATEGY 2: Prepare and distribute geoboards and rubber bands. Say, "Segments, angles or figures that are the same exact size are congruent." Draw the following diagram on the chalkboard.

5.09.05

STRATEGY 2: cont'd

e.g.,



Say, "Place a rubber band from A-1 to A-5. Place a rubber band from A-1 to E-1. Place a rubber band from E-1 to E-5. Place a rubber band from E-5 to A-5. Which line segments are congruent? What do we call a polygon when all four sides are congruent? (square) Construct two squares that are congruent. Remember they must be the exact same size."

Repeat this procedure asking students to construct other congruent polygons.

5.09.05.02 **recognize and construct similar figures**

STRATEGY 1: Prepare and distribute dot paper. Ask the students to draw a triangle. Say, "Draw the same triangle in a smaller size. These triangles are not the same size but they look alike. They are similar. Two polygons that have the same shape but are not the same size are called similar figures."

Ask the students to construct other similar figures.

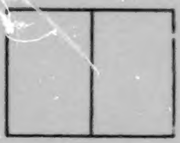
STRATEGY 2: Prepare and distribute paper, rulers, compasses, protractors. Say, "Fold your paper into four boxes. Use your ruler and draw a rectangle. Then draw a similar rectangle in the same box."

Repeat this procedure for angles and circles.

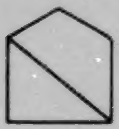
P.O. 5.09.05.01

NAME: ______________________________ CLASS; ________ DATE: ________

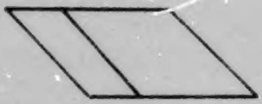
1. Are these shapes divided into congruent parts?
2. Using a compass construct a line segment congruent to A,B, and a line segment congruent to C,D.
3. Use a protractor to construct the angle DEF ≅ JKL.



_____



_____



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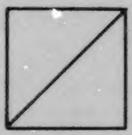

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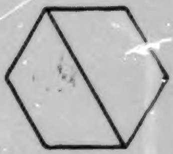

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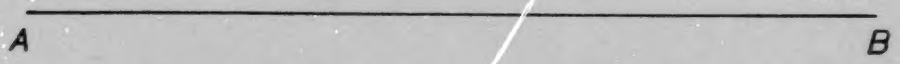
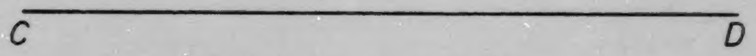
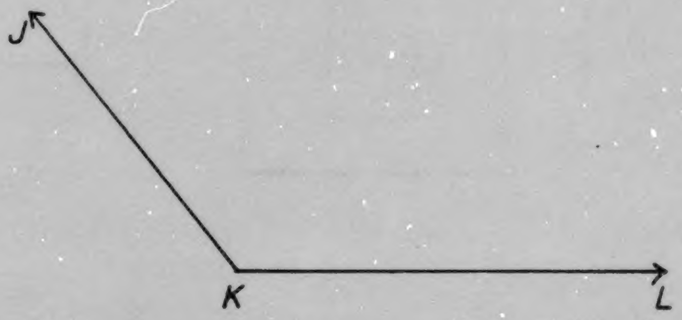




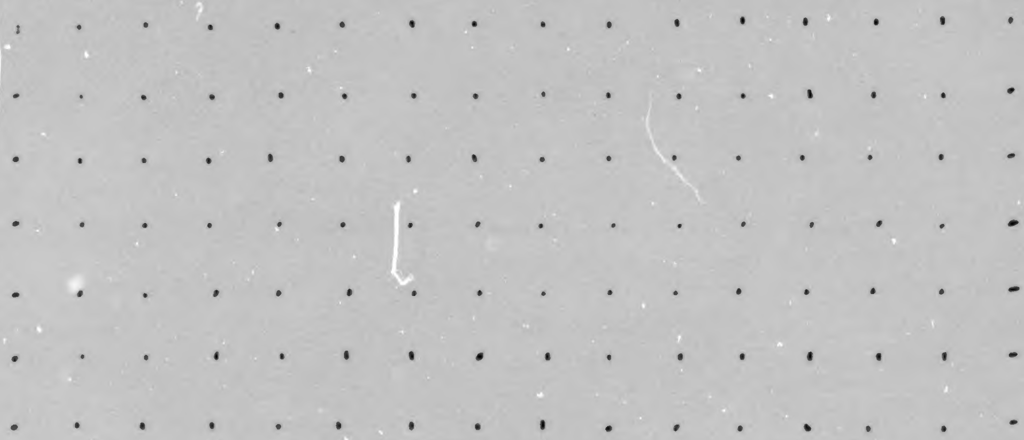


P.O. 5.09.05.02

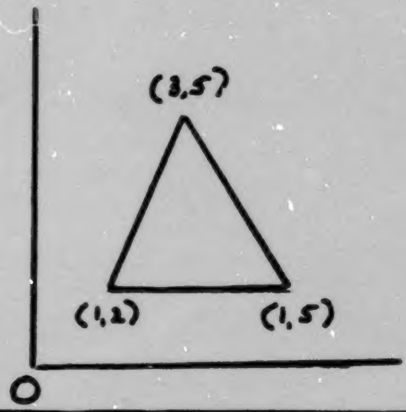
NAME:__________________________________CLASS:________DATE:_______

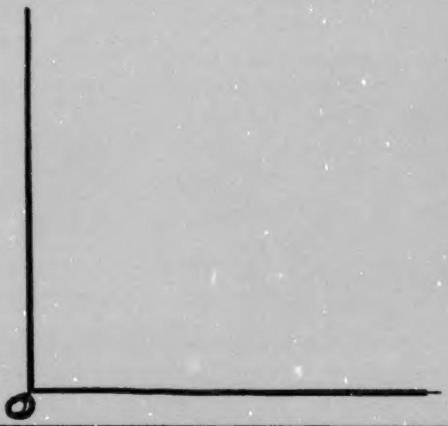
1. Construct similar shapes.
2. Multiply the coordinates by 2 and construct similar shapes.
3. Using a ruler construct similar shapes.

1.



2.

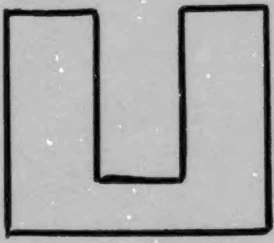




3.

A

B



C.

5.02.02 ADDITION - THREE OR MORE NUMBERS THROUGH 999,999

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.02.02.01B estimate by rounding addends to the largest possible place;

e.g.,

214,742 rounds to 210,000
19,863 rounds to 20,000
3,120 rounds to 3,000
233,000

5.02.02.02A add three or more numbers and check;

e.g.,

	check
	237,725
214,742	214,742
19,863	19,863
+ 3,120	3,120
237,725	

5.02.02.03A solve word problems related to skills learned in this module.

e.g., Our school district had three separate deliveries of pencils last year. 15,238 pencils were delivered in January, 22,465 in May and 18,562 in September. How many pencils were delivered last year?

estimate	add	check
		56,265
15,000	15,238	22,465
22,000	22,465	15,238
19,000	+18,562	+18,562
56,000	56,265	

GETTING STARTED

Draw a place value chart through one hundred thousand on the chalkboard. Write several 2-, 3-, 4-, 5- and 6-digit numbers on the chalkboard. Ask the students to write the numbers on the place value chart. Ask the students to write each number in expanded notation in their notebooks.

e.g.,

472,315 = 400,000 + 70,000 + 2,000 + 300 + 10 + 5

Write several 2-, 3-, 4-, 5- and 6-digit numbers on the chalkboard. Ask the students to round the numbers to the nearest ten, hundred, thousand, ten-thousand and hundred thousand.

5.02.02

5.02.02.01 **estimate by rounding addends to the largest possible place**

STRATEGY 1: Write 167,385 on the chalkboard. Say, "What is the largest possible place to which this number can be rounded? (hundred thousands) What is 167,385 rounded to the nearest hundred thousand?" (200,000)

Repeat this procedure with other examples of 4-, 5-, and 6-digit numbers. Ask the students to round numbers and estimate a sum.

STRATEGY 2: Write the following example on the chalkboard.

```
  67,893
 436,071
  52,384
 + 9,721
 -------
```

Say, "We can estimate an answer to addition problems by rounding the addends and adding those numbers." Ask the students to determine the largest place to which each number can be rounded. Ask the students to round each number to the largest possible place. e.g.,

```
  70,000
 400,000
  50,000
 +10,000
 -------
```

Ask the students to add the rounded numbers and then the actual addends.

120

5.02.02

5.02.02.02 **add three or more numbers and check**

STRATEGY 1: Ask the students to draw place value charts in their notebooks. Write several addition examples with three or more addends in horizontal format on the chalkboard. Say, "Rewrite the examples vertically. Use the place value chart in your notebooks, compute the sum and check."

e.g.,

32,423 + 23 + 465 + 541,329

H Th	T Th	Th	H	T	O
	3	2	4	2	3
				2	3
			4	6	5
5	4	1	3	2	9
5	7	4	2	4	0

check
574,240
32,423
23
465
541,329

STRATEGY 2: Distribute three small sheets of paper to each student. Say, "Write a 6-digit number on one sheet, a 5-digit number on the second sheet and on the third sheet you may write either a 1-, 2-, 3-, or 4-digit number." Collect the slips and place all the 6-digit numbers in one envelope, the 5-digit numbers in a second envelope and the remaining numbers in a third envelope. Ask the students to pick one slip from each envelope and use the numbers on each slip to write an addition example. Say, "Be sure to line up the numbers so that the digits are in the correct place. Find the sum and check your answer."

5.02.02

5.02.02.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> Our school district had three separate deliveries of pencils last year. 15,238 were delivered in January, 22,465 in May, and 18,562 in September. How many pencils were delivered last year?

Say, "What operation can we use to solve this problem?" (addition) Ask a student to write the addition example on the chalkboard. Ask a student to round each addend to estimate the sum. Ask another student to complete the addition, label the answer and check.

STRATEGY 2: Write the following problem on the chalkboard.

> In a one month period, the following amounts were spent on certain video games: Pack Man, $3,954.25; Centipede, $1,536.50; Zaxxon, $997.75 and Donkey Kong, $835.50. How much was spent in all on these video games?

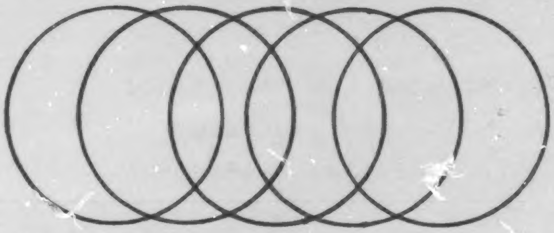
Ask the students to arrange the addends in column addition (vertical) form and round each addend as though it were a whole number. Ask two students to come to the chalkboard, add the examples and check. e.g.,

		check
$3,954.25	$4,000.00	$3,954.25
1,536.50	2,000.00	1,536.50
997.75	1,000.00	977.75
+ 835.50	+ 800.00	835.50

P.O. 5.02.02.01

NAME:______________________CLASS:_________DATE:_______

Round the addends in each example to the largest possible place. Estimate the sum.



ROUND AND ROUND

Round and estimate

214,742	200,000
19,863	20,000
+ 3,120	3,000
	233,000

Round and estimate

41,910
55,727
+ 69,784

Round and estimate

22,821
12,687
399
18

Round and estimate

3,784
2,690
1,907

Round and Estimate

$294.18
143.79
628.15

Round and estimate

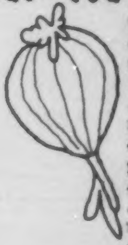
$427.18
70.17
9.50
.25

P.O. 5.02.02.02

NAME: ______________________ CLASS: ________ DATE: ________

Find each sum and check.

41,187
5,421
+ 3,485



$6,60.78
2,12.12
+ 24.95

5,629
4,872
275
+ 14

$5,115.25
1,250.00
+ 52.97

86,187
25,487
+64,785

$28.74
96.42
+87.65

P.O. 5.02.02.03

NAME: ______________________________ CLASS: ________ DATE: ______

Read the problems then: 1. Round the addends and estimate the sum. 2. Add the numbers of the problem. 3. Check your work.

1)

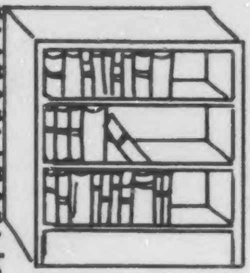
A spaceship traveling to Saturn has 3 parts. The first part weighs 36,195 tons, the second weighs 22,195 tons, and the third part weighs 11,292. What is the total weight of the ship?

Estimate	Solve	Check
40,000	36,195	69,682
20,000	22,195	36,195
10,000	11,682	22,195
70,000	69,682	11,292

2)

12,903 people travel to the city in the morning. 3,294 travel in the afternoon and 7,976 travel in the evening. How many people travel into the City in the day?

Estimate Solve Check



3) The central library received 14,095 books in January, 11,297 in February and 10,011 in March. How many books did the library recieve in the 3 months?

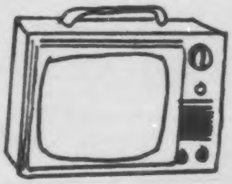
Estimate Solve Check

4)

The 747 airplane traveled 4,595 miles Monday, 2,697 miles Tuesday and 1,035 miles on Wednesday. How many miles did it travel in all?

Estimate Solve Check

5)



The Smith family needs a new stove, refrigerator , a television. The best price they found for the refrigerator was $535.62, for the stove $739.27 and the television $337.19. What was the total price of all three items?

Estimate Solve Check

5.03.02 SUBTRACTION THROUGH 6-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.03.02.01A estimate differences by rounding minuends and subtrahends (less than 1 million) to the nearest 100,000;

e.g.,

```
294246 rounds to  300000
183125 rounds to -200000
                  ------
                  100000
```

5.03.02.02A subtract 6-digit number and check;

e.g.,

```
                    check
 794046            433125
-433125           +360921
-------           -------
 360921            794046
```

5.03.02.03A solve word problems related to skills learned in this module.

e.g.,

There were 214,632 people living in Hawley. 111,241 moved away. How many people were left in Hawley?

```
             check
 214632      103391
-111241     +111241
-------     -------
 103391      214632
```

VOCABULARY

TERMS

difference
estimate

GETTING STARTED

Prepare and distribute squared materials. Write the following numbers on the chalkboard.

81	584
26	363
62	725

Say, "Use the squared material to rename each number. Exchange 1 ten for 10 ones or 1 hundred for 10 tens."

e.g.,

81 = 7 tens and 11 ones
584 = 4 hundreds 18 tens and 4 ones.

Prepare a set of squared material. Use the material to display 67 and 34. Ask a student to write two addition sentences for this arrangement.

e.g.,

67 + 34 = 101   34 + 67 = 101

Place the two sets of squared material together. Ask a student to remove 67. Ask another student to write the corresponding subtraction sentence.

e.g.,

101 - 67 = 34

Replace the squared material. Ask a student to remove 34 and write the corresponding subtraction sentence.

e.g.,

101 - 34 = 67

Ask the students to look at the four number sentences.

34 + 67 = 101   67 + 34 = 101
101 - 34 = 67   101 - 67 = 34

Say, "The inverse relationship shows us why we use addition to check subtraction."

5.03.02

5.03.02.01 **estimate differences by rounding minuends and subtrahends (less than 1 million) to the nearest 100,000**

STRATEGY 1: Write the following problem on the chalkboard.

> The attendance at Sunday's baseball game was 294,246 and the attendance at Monday's game was 183,125. Estimate the difference of the attendance for these two nights.

Say, "One way to estimate an answer is to round the numbers. What is 294,246 rounded to the nearest hundred thousand? What is 183,125 rounded to the nearest hundred thousand?"

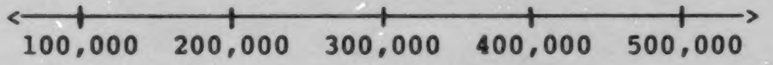
e.g.,

294,246	300,000
-183,125	200,000
111,121	100,000

Ask the students to subtract the rounded numbers to find the estimate and then do the actual subtraction.

STRATEGY 2: Draw a number line on the chalkboard.

e.g.,



Ask a student to locate the approximate place where 236,782 might fall. Say, "To the nearest hundred thousand, 236,782 rounds to 200,000." Ask a student to locate the approximate place 386,784 would fall on the number line. Say, "To the nearest hundred thousand, 386,784 rounds to 400,000." Ask the class to estimate the difference and then find the actual difference.

e.g.,

400,000	386,784
-200,000	-236,782
200,000	150,002

Repeat this procedure with similar problems.

5.03.02

5.03.02.02 subtract a 6-digit number and check

STRATEGY 1: Write the following on the chalkboard.

e.g.,

H Th	T Th	Th	H	T	O
8	7	2	5	6	3
-6	5	3	2	9	4

Say, "Look at the ones place. In order to subtract, we must regroup 1 ten for 10 ones." Ask a student to show the regrouping on the chalkboard and subtract. Say, "Look at the tens column. We must regroup 1 hundred for 10 tens." Ask a student to regroup and subtract. Repeat this procedure until the example is completed.

e.g.,

$$\begin{array}{r} 8\overset{6}{\cancel{7}}\overset{12}{\cancel{2}},5\overset{5}{\cancel{6}}\overset{13}{\cancel{3}} \\ \underline{-653,294} \\ 219,269 \end{array}$$

Say, "How can we check this problem?" (Add the difference to the subtrahend.)

e.g.,

$$\begin{array}{r} \underline{\text{check}} \\ 219,269 \\ \underline{+653,294} \\ 872,563 \end{array}$$

STRATEGY 2: Write the following on the chalkboard.

e.g.,

Mountain	Height in feet
Mt. Whitney	659,687
Mt. Snowbe	609,762

Say, "How much higher is Mt. Whitney than Mt. Snowbe? You must subtract to find the answer to this problem." Ask a student to write the example on the chalkboard.

e.g.,

$$\begin{array}{r} 6\overset{4}{\cancel{5}}\overset{18}{\cancel{9}},{}^{1}687 \\ \underline{-609,762} \\ 49,925 \end{array}$$

STRATEGY 2: cont'd

Say, "We start to subtract in the ones column. Remember to regroup when necessary. If we add 49,925 to the height of Mt. Snowbe, we will get the height of Mt. Whitney. That is the way we check our answer."

Repeat this procedure with similar problems.

5.03.02.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write this problem on the chalkboard.
e.g.,

> There are 396,482 seats at the Mohawk Stadium. There were 252,986 people at Sunday's football game. How many seats were empty?

Say, "This is a subtraction problem. Estimate the answer by rounding the subtrahend and the minuend to the nearest hundred thousand and then find the actual difference."
e.g.,

```
     400,000           396,482
    -300,000          -252,986
     100,000           143,496
```

Say, "We check the problem by addition."

STRATEGY 2: Write the following problem on the chalkboard.

> A train weighs 398,786 pounds with coal. It weighs 252,124 pounds without coal. How much does the coal weigh?

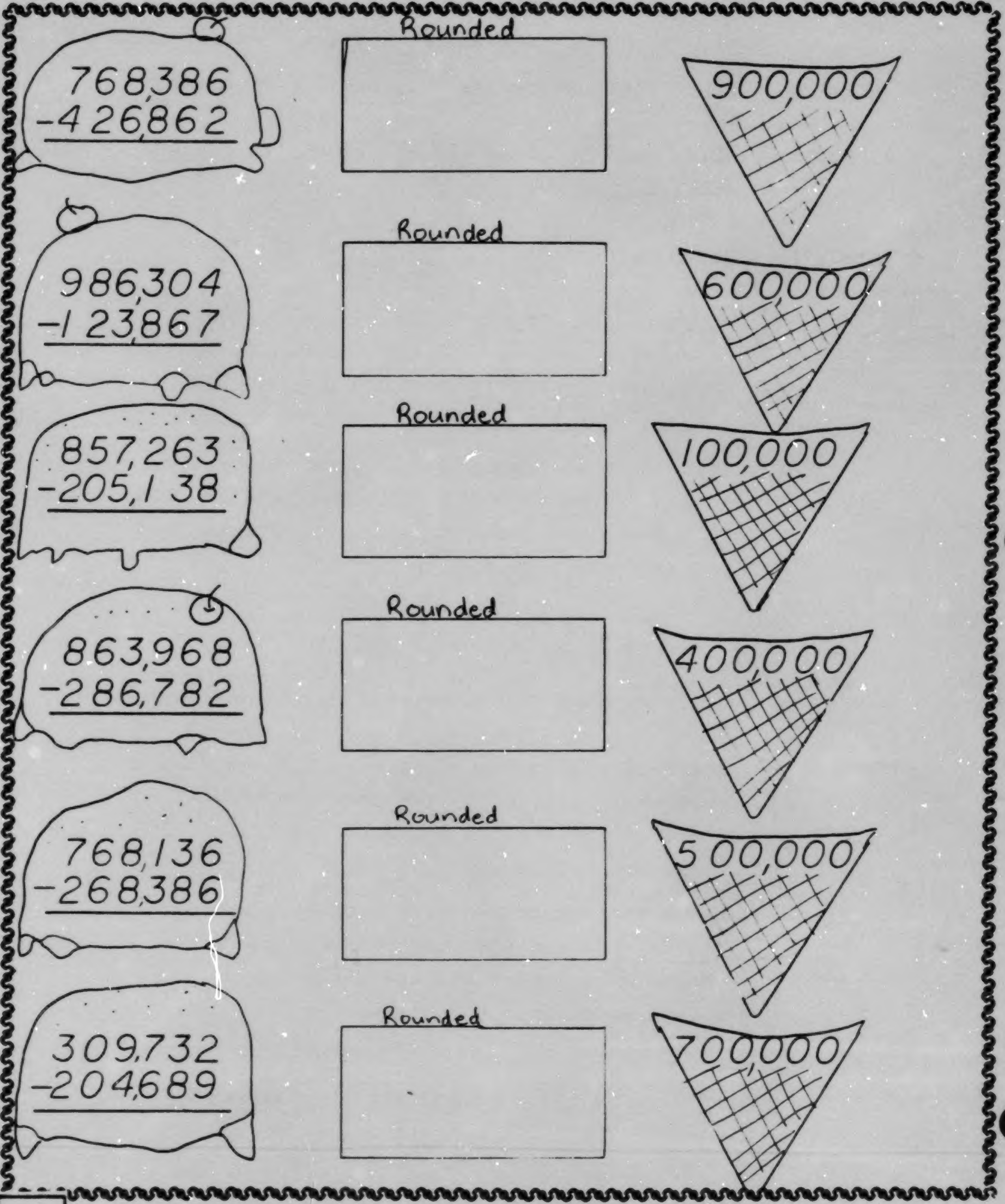
Ask a student to read the problem. Ask another student to read the question and name the operation. Say, "Estimate the answer, find the actual difference and check."

```
e.g.,                              check
     400,000      398,786      252,124
    -200,000     -252,124     +146,662
     200,000      146,662      398,786
```

P.O. 5.03.02.01

NAME:______________________________ CLASS:__________ DATE:________

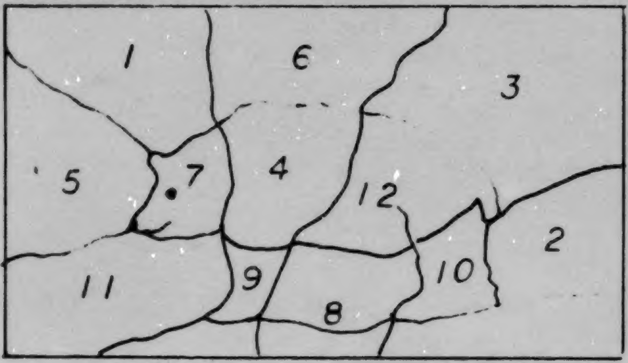
Put the ice cream on the cone. Round each number to the nearest hundred thousand. Match the problem to the estimated difference.


768,386
-426,862
Rounded
900,000
986,304
-123,867
Rounded
600,000
857,263
-205,138
Rounded
100,000
863,968
-286,782
Rounded
400,000
768,136
-268,386
Rounded
500,000
309,732
-204,689
Rounded
700,000

P.O. 5.03.02.02

NAME: ______________________ CLASS: ________ DATE: ________

Find the difference and check each example. If the difference is odd, color the numbered area green. If the difference is even, color the numbered area brown.



(1) 986,389
−127,762
check

(2) 867,961
−763,982
check

(3) 782,000
−173,763
check

(4) 863,960
−170,076
check

(5) 762,891
−173,986
check

(6) 983,386
−687,123
check

(7) 486768
−386236
check

(8) 786,174
−362,333
check

(9) 863,175
−172,963
check

(10) 963,864
−454462
check

(11) 586,127
−104,114
check

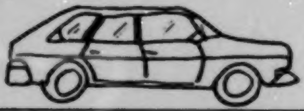
(12) 236,122
−123456
check

P.O. 5.03.02.03

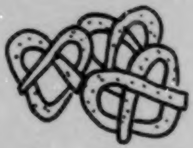
NAME: ______________________ CLASS: __________ DATE: ________

1) Last season 819,382 people attended football games at Giant Stadium and 639,457 attended baseball games at Shea Stadium. How many more people attended football games than baseball games?

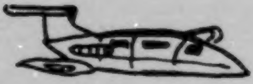
2) 728,625 people from Brooklyn drive their cars to work. 571,394 people take the bus. What is the difference between drivers and riders?



3) In 1982 a school purchased 946,257 pretzels. In 1983 the school purchased 839,156 pretzels. How many more pretzels did they purchase in 1982?



4) In one month, Tri-City Airline planes fly 436,524 miles. North South planes fly 642,717 miles. How many more miles does North South fly than Tri-City?



5) Last year Winter Car Company built 872,654 cars. They sold 746,438 of these cars. How many cars were not sold?

Unit 41

5.08.01 POSITIVE AND NEGATIVE NUMBERS

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.08.01.01B use positive and negative numbers in real situations and games;

e.g.,

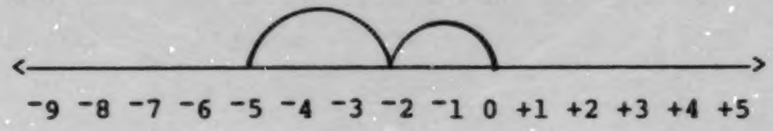
Mary owes the grocery \$5.00. She went to the store again and now she owes another \$6.00. How much does she owe all together?

$$\begin{array}{r} {}^-5 \\ +{}^-6 \\ \hline {}^-11 \end{array}$$

She owes \$11.00

5.08.01.02B use the number line to solve problems relating to negative and positive numbers and identify zero as a neutral number.

e.g.,



$$\begin{array}{r} {}^-2 \\ +{}^-3 \\ \hline -5 \end{array}$$

VOCABULARY

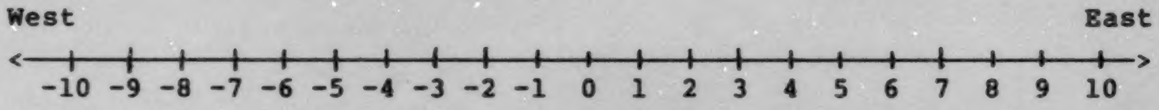
TERMS	SYMBOLS
negative	-
positive	+

GETTING STARTED

Prepare and display a centigrade thermometer. Ask the students to locate various degrees on the thermometer, e.g., 30°, 50°, 0°, -20°, -40°, -25°. Say, "Which is warmer -10° or -20°? (-10°) The further down we go from zero the colder it is. The further up from zero we go the warmer it gets."

Draw a number line road map on the chalkboard.

e.g.,



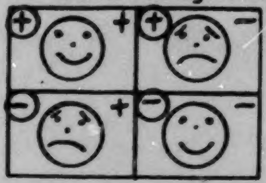
Say, "Each integer represents a mile marker. Where will a 4 mile trip beginning at zero take you? On this number line knowing the length of the trip is not sufficient, we must also know the direction. Let's travel 4 miles east from zero. Where will we be on the map? ($^{+}4$) Let's continue 3 miles further east. Where are we now?" ($^{+}7$)

Repeat this procedure.

5.08.01

5.08.01.01 **use positive and negative numbers in real situations and games**

STRATEGY 1: Draw the following chart on the chalkboard.



Say, "Look at the chart. We will use this chart to help us solve problems with signed numbers. The + sign indicates a check. A - sign indicates a bill. A + sign within a circle indicates that the postman brings you a bill or a check. A - sign within a circle indicates that the postman takes away a bill or a check." Point to the first square and say, "The postman brings ⊕ you a check $^{+}$. You are happy ☺." Point to the second square and say, "The postman brings ⊕ you a bill $^{-}$. You are sad ☹." Point to the lower left square and say, "The postman takes away ⊖ your check $^{+}$. You are sad ☹." Point to the fourth square and say, "The postman takes away ⊖ your bill $^{-}$. You are happy ☺. The postman brings you a check for six dollars and a check for ten dollars. Are you happy or sad? How much money do you have?" Write the following on the chalkboard.

$^{+}6 + {}^{+}10 = {}^{+}16$

Say, "A postman brings you a bill for three dollars and a bill for four dollars. Are you happy or sad? How much money do you owe?" Write the following on the chalkboard.

$^{-}3 + {}^{-}4 = {}^{-}7$

Repeat this procedure for other possibilities.

STRATEGY 2: Prepare and display a Fahrenheit thermometer. Say, "On a cold winter day the temperature was 10° F. The next day it dropped to $^{-}2°$. How many degrees

STRATEGY 2: cont'd

did the temperature drop?" Point to the thermometer. Say, "The first day the temperature was 10° above zero. The second day it fell 2° below zero. The temperature dropped 10° to 0 and dropped another 2°. The temperature dropped 12° in all."

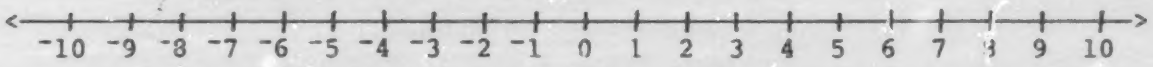
Repeat this procedure.

5.08.01.02 **use the number line to solve problems relating to negative and positive numbers and identify zero as a neutral number**

STRATEGY 1: Draw a vertical number line on the chalkboard. Number the line from $^{-}10$ through $^{+}10$. Say, "A worker enters a power plant at ground level indicated as (0). I will give the worker instructions." Ask a student to pretend to be a worker. Say, "Go up 4 levels, then down 3 levels - where are you? ($^{+}1$) Go up 7 levels and down 10 levels - where are you?" ($^{-}3$)

Repeat this procedure.

STRATEGY 2: Draw the following number line on the chalkboard. e.g.,



Ask a student to come to the chalkboard. Say, "Place your finger at zero. I will name a special kind of number. The first part of the number will tell you the direction and the number will tell you how many spaces to move. e.g., positive four moves four spaces to the right. If I name a negative number you move to the left. If I say negative six, move your finger six spaces to the left. You will wind up on $^{-}2$."

Repeat this procedure.

P.O. 5.08.01.01.

NAME: ______________________________ CLASS; ________ DATE: ________

Fill in the magic squares by adding the signed numbers.

$^{+}3$	$^{-}1$	
$^{-}5$	$^{-}4$	
$^{-}2$		

$^{-}4$	$^{+}6$	
$^{+}3$	$^{-}6$	

$^{+}6$	$^{-}3$	
$^{-}4$	$^{-}7$	

$^{-}6$	$^{-}4$	
$^{+}4$	$^{+}2$	

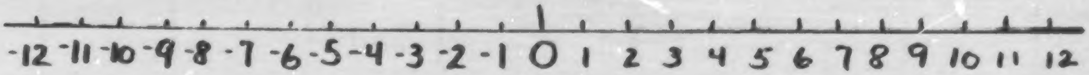
$^{+}8$	$^{-}4$	
$^{+}3$	$^{-}1$	

$^{+}8$	$^{-}3$	
$^{-}4$	$^{+}6$	

P.O. 5.08.01.02

NAME:____ CLASS:__________ DATE:________

Use the number line to complete the problems.


-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12

1. $^{+}5 + ^{-}10 = \square$
2. $^{-}4 + ^{-}6 = \square$
3. $^{+}6 + ^{-}6 = \square$
4. $^{-}11 + ^{+}14 = \square$
5. $^{+}12 + ^{-}18 = \square$
6. $^{-}7 + ^{+}9 = \square$
7. $^{+}3 + ^{-}3 = \square$
8. $^{+}0 + ^{-}7 = \square$
9. $^{+}2 + ^{-}8 = \square$
10. $^{-}9 + ^{+}13 = \square$
11. $^{+}12 + ^{-}12 = \square$
12. $^{-}11 + ^{+}3 = \square$
13. $^{-}4 + ^{+}2 = \square$
14. $^{+}4 + ^{-}3 = \square$
15. $^{+}8 + ^{-}6 = \square$

I got a check.
I got a bill.

5.13.04 PROBLEM SOLVING - LISTS AND TABLES

(1-2 lessons)

PERFORMANCE OBJECTIVES

The students will be able to...

5.13.04.01A solve problems by arranging information in a list;

e.g.,

How many numbers from 1 to 30 are multiples of 4?

1, 2, 3, 4...

Circle every fourth number.

5.13.04.02A solve problems by arranging information in a table.

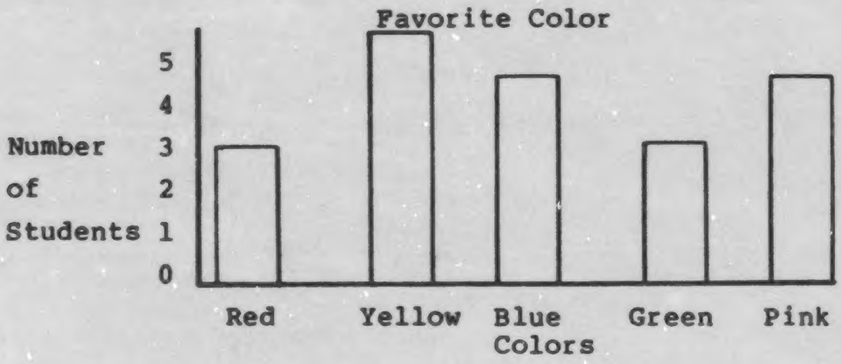
e.g.,

During one month we bought the following items:
A computer for $600.00, twenty packages of Reese's pieces for $.40 each, a two pound steak for $8.00, six bags of frozen french fries at $.49 each, a ten speed bicycle for $250.00 and ten packages of Kool-Aid for $.25 each. On which item did we spend the least amount of money?

Item	Cost	Number Purchased	Total Cost

GETTING STARTED

Draw the following bar graph on the chalboard.



Say, "Which was the most popular color? Which colors were tied? How many children liked red and pink?"

Repeat this procedure using other questions.

Draw the following table on the chalkboard.

Food	Serving Portion	Calories
Apple	1	30
Milk (Skim)	1 cup	88
Eggs	1 boiled	81
Whole Wheat Bread	1 slice	56
Swiss Cheese	1 oz.	101

Say, "If you ate a sandwich with one sliced egg and two slices of whole wheat bread, how many calories would that be? (193) If you had a glass of skim milk and an apple, how many calories would that be?" (168)

Repeat this procedure using other questions.

STRATEGY 1: cont'd

costs.) How can we arrange this information in a way that can be easily seen?" (chart) Draw the following chart on the chalkboard and record the information. Note: Remind students that ounces must be converted to pound equivalents to solve the problem, e.g., 8 ounces = $\frac{1}{2}$ lb.

e.g.,

Item	Cost	Total Weight	Cost Per Pound

STRATEGY 2: Write the following information on the chalkboard.

e.g.,

Sunday:	30 sandwiches	16 salads	25 drinks
Monday:	32 drinks	35 sandwiches	10 salads
Tuesday:	19 salads	40 drinks	25 sandwiches
Wednesday:	35 drinks	27 salads	52 sandwiches
Thursday:	20 salads	32 drinks	37 sandwiches
Friday:	50 sandwiches	40 salads	19 drinks
Saturday:	30 salads	27 sandwiches	32 drinks

Say, "Sal owns a restaurant. This is the number of salads, drinks and sandwiches sold in one week. How can we find out on which days he sold the most of any one item or the least of any item?" (Make a chart.)

Draw the following chart on the chalkboard and ask the students to complete it.

e.g.,

Day	Salads	Drinks	Sandwiches

5.13.04

5.13.04.01 solve problems by arranging information in a list

STRATEGY 1: Say, "I have a problem. I need to know how many odd numbers there are between 15 and 47. I don't know how to figure out the answer." Ask the students for suggestions and try each method. Say, "One method is to list all the numbers from 15 to 47 and count the odd numbers." Repeat this procedure using other examples.

STRATEGY 2: Prepare a set of dice. Say, "We are going to play a game using dice. Before we start, how many different products do you estimate can be obtained by multiplying the face values of two dice?" Record students' estimates on the chalkboard. Ask a student to come to the front of the room, roll the dice, record the numbers on the chalkboard and find the product. After all the possible combinations have been recorded, count the different products and compare them with the estimates.

5.13.04.02 solve problems by arranging information in a table

STRATEGY 1: Write the following problem on the chalkboard. e.g.,

> During one month we bought the following items: A computer which weighs 14 pounds and cost \$600.00, two ounces of raisins for \$.40, a two pound steak for \$8.00, an eight ounce bag of frozen carrots for \$.50, a ten speed bicycle weighing 26 pounds for \$260 and an orange juice mix weighing $\frac{1}{2}$ ounce for \$.25. Which was the least expensive item per pound?

Say, "How can we solve this problem? (We must find the cost of each item per pound and compare the

P.O. 5.13.04.01

NAME: ______________________ CLASS: __________ DATE: ________

Solve the problems.

How many times does the digit 2 appear in the numbers from 200 to 220?

How many odd numbers are there between 25 and 50?

How many numbers from 1 to 30 are multiples of 6?

P.O. 5.13.04.02

NAME:______________________________ CLASS:________ DATE:________

Solve the problem by arranging the information in the table.

The Yellow Cab Company wants to know which hotel in New York City its drivers go to most frequently. Below you will find the names of the drivers and the number of trips to each hotel.

Mr. Lewis -	Waldorf (8), Plaza (3), Vista (12), Milford (10), Sheraton (14)
Ms. Jones -	Milford (5), Sheraton (10), Plaza (11), Waldorf (7), Vista (8)
Mrs. Brown -	Plaza (8), Waldorf (13), Vista (10), Sheraton (12), Milford (11)
Mr. Smith -	Milford (8), Waldorf (11), Sheraton (13) Vista (9), Plaza (5)
Ms. Casey -	Sheraton (5), Plaza (4), Waldorf (6), Vista (7), Milford (10)

Driver	Waldorf	Plaza	Vista	Milford	Sheraton

Unit 43

5.01.04 PRIME NUMBERS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.04.01B identify a prime number as one having exactly two factors: 1 and itself;

e.g.,

3, (3 x 1, 1 x 3)

5.01.04.02B identify a composite number as any whole number having more than two factors;

e.g.,

16 (16 x 1, 4 x 4, 8 x 2)

5.01.04.03B rename a composite number as a product of its primes.

e.g.,

16 = 2 x 2 x 2 x 2

18 = 2 x 3 x 3

5.01.04

VOCABULARY

TERMS

prime number
composite number
factors

GETTING STARTED

Duplicate a multiplication matrix as shown, randomly leaving out products.

e.g.,

X	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0			3			6			
2	0	2			8			14		18
3	0		6			15			24	
4	0	4		12			24			36
5	0		10		20			35		
6	0	6		18		30			48	
7	0		14		28		42			63
8	0	8		24				56		
9	0				36		54			81

Ask the students to fill in the missing numbers.

Write the following on the chalkboard.

e.g.,

1 x 13 =☐
1 x 1,000 =☐
1 x 29 =☐
1 x 136 =☐

Ask the students to solve each example. Say, "Any number times one is the number itself."

Write 2 x (3 x 2) = (2 x 3) x 2 on the chalkboard. Ask a student to solve. Say, "When we change the order of the factors the product is the same." Ask a student to write an example and ask another student to solve it.

5.01.04

5.01.04.01 **identify a prime number as one having exactly two factors: 1 and itself**

STRATEGY 1: Write the following numbers on the chalkboard: 3, 12, 5, 16. Say, "How many different multiplication facts can we write for the products on the chalkboard?"

e.g.,

3 x 1	12 x 1	1 x 5	16 x 1
1 x 3	1 x 12	5 x 1	1 x 16
	2 x 6		4 x 4
	6 x 2		8 x 2
	4 x 3		2 x 8
	3 x 4		

Say, "What do you notice about the facts written on the chalkboard?" (The products 12 and 16 have many factors. The products 3 and 5 have only two.) The numbers in the multiplication facts are called the factors of that product. List the factors for each product."

e.g.,

3	12	5	16
1,3	1,12,2,6,3,4	1,5	16,1,4,8,2

Say, "How many factors does each product have? What do you notice about the factors? (Both 3 and 5 have only two factors, one and themselves.) Any number greater than one that has only two factors (or is divisible by only one and itself) is called a prime number." Write the numbers on the chalkboard and ask the students to determine whether or not they are prime numbers, e.g., 10, 7, 9, 11.

Repeat this procedure.

STRATEGY 2: Write 8 x 2 = 16 on the chalkboard. Say, "8 and 2 are called the factors of 16. What are the other factors of 16?" (4, 16 and 1) Repeat this

STRATEGY 2: cont'd

procedure using 12 and 18. Write 7 x 1 = 7 on the chalkboard. Say, "What are the factors of 7?" (7 and 1) Repeat this procedure for 2, 11 and 13. Say, "What do you notice about the numbers we have written on the chalkboard and their factors? (Some numbers have many factors and some numbers have only two factors.) What do you notice about the numbers that have only two factors? (One factor is 1 and the other is the number itself.) When a number greater than 1 has only two factors, one factor being 1 and the other factor being the number, we call that number a prime number." Write several numbers on the chalkboard and ask the students to find the factors and identify the prime numbers.

5.01.04.02 **identify a composite number as any whole number having more than two factors**

STRATEGY 1: Adapt Strategy 1 used in P.O. 5.01.04.02. Emphasize the numbers with more than two factors. Say, "We call numbers with more than two factors composite numbers."

STRATEGY 2: Prepare and display a composite photograph (one made of different poses of the same person) or make a composite picture from newspaper, magazine or personal pictures. Say, "This is called a composite picture. Why do you think it has this name?" (It is a composite picture because it uses many photos to make one large picture.) Write 3, 10 on the chalkboard. Say, "What do we call the number 3? (3 is a prime number because its only

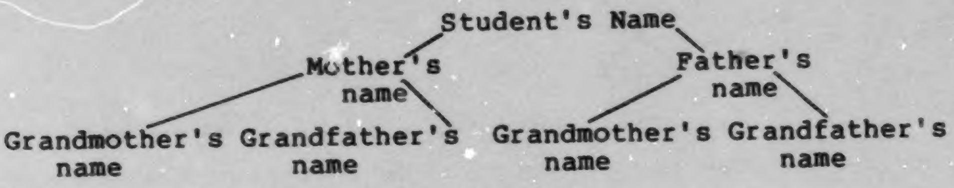
STRATEGY 2: cont'd

factors are 1 and 3.) How many factors does the number 10 have? (four factors, 1, 10, 2 and 5) We call ten a composite number because it has many factors." Write 2,12,7,18 on the chalkboard. Ask the students to circle the composite numbers. Repeat this procedure.

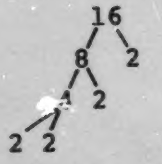
5.01.04.03 rename a composite number as a product of its primes

STRATEGY 1: Say, "We are going to make a family tree for one of the students in the class. What is a family tree?" (A family tree is a diagram of a person's family.) Ask one student to write his/her family tree on the chalkboard.

e.g.,


Student's Name
Mother's name
Father's name
Grandmother's name
Grandfather's name
Grandmother's name
Grandfather's name

Say, "Numbers also have family trees. We are going to make a family tree for the number 16." Write the following on the chalkboard.



Say while pointing to the chalkboard, "8 and 2 are factors of 16. 2 is a prime number, but 8 is not. 4 and 2 are factors of 8. 2 is a prime number but 4 is not. 2 and 2 are factors of 4. We have now drawn the family tree for 16 by finding all of the

STRATEGY 1: cont'd

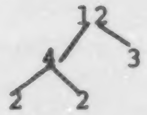
prime numbers that make up 16. We can write 16 as 2x2x2x2." Write the prime numbers on the chalkboard. Say, "We can rename a composite number as the product of its primes."

Repeat this procedure using other composite numbers.

STRATEGY 2:

Write a simple recipe on the chalkboard. Say, "What is this called? (a recipe) What is a recipe? (A recipe tells you all the parts and the amount of each you need in order to make something like bread or a cake.) A composite number also has a recipe. It is a recipe of all the prime numbers it takes to make the composite number. In order to find the recipe for a composite number, we must make a number tree." Construct a number tree on the chalkboard.

e.g.,



Say, "All the prime numbers on the number tree are the recipe for 12. We multiply 2x2x3 to make 12. We call this renaming of 12 the product of its primes."

Repeat this procedure using other composite numbers.

P.O. 5.01.04.01

NAME: ______________________ CLASS: __________ DATE: ________

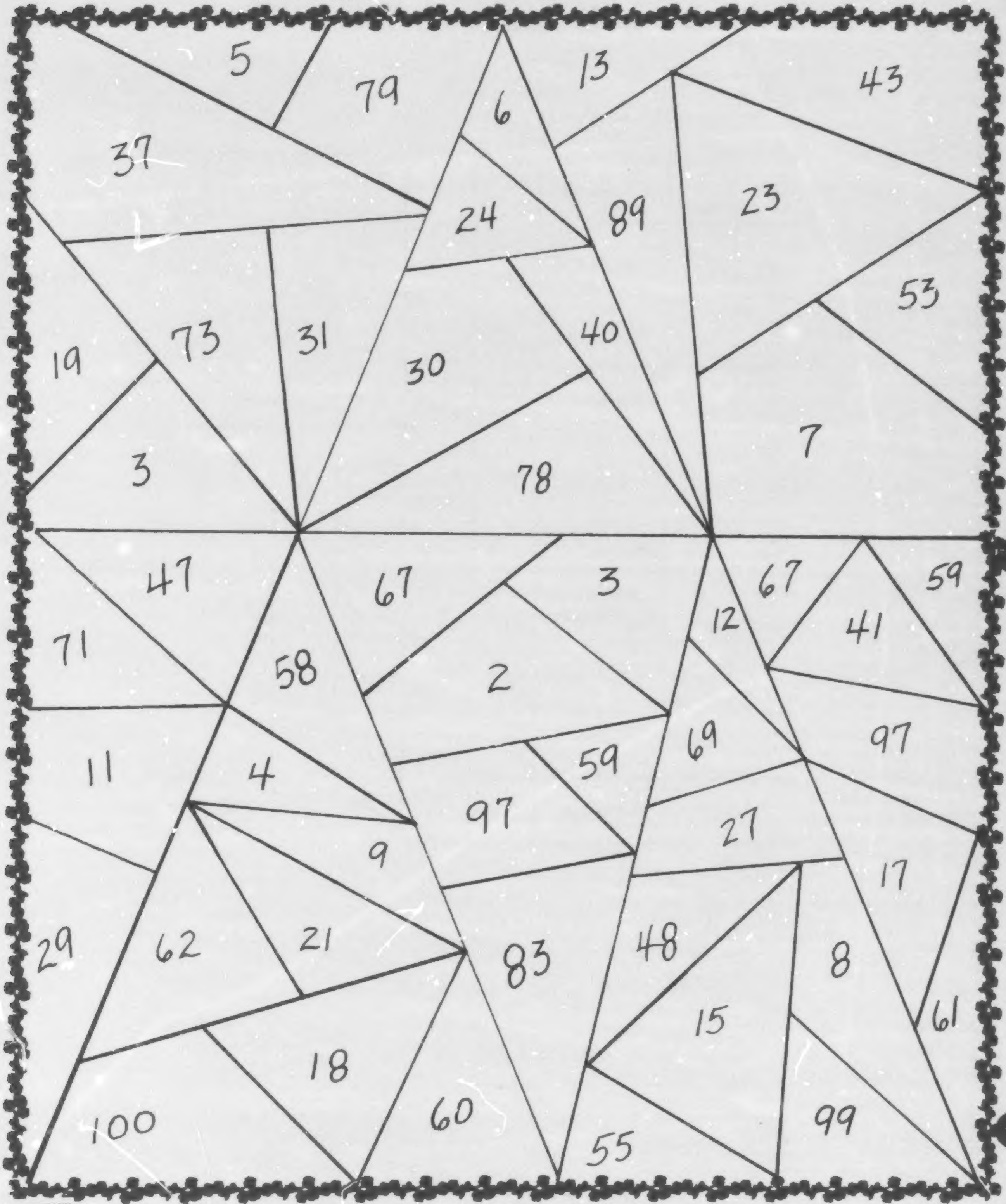
Circle all the prime numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

P.O. 5.01.04.02

NAME: ______________________ CLASS: __________ DATE: ________

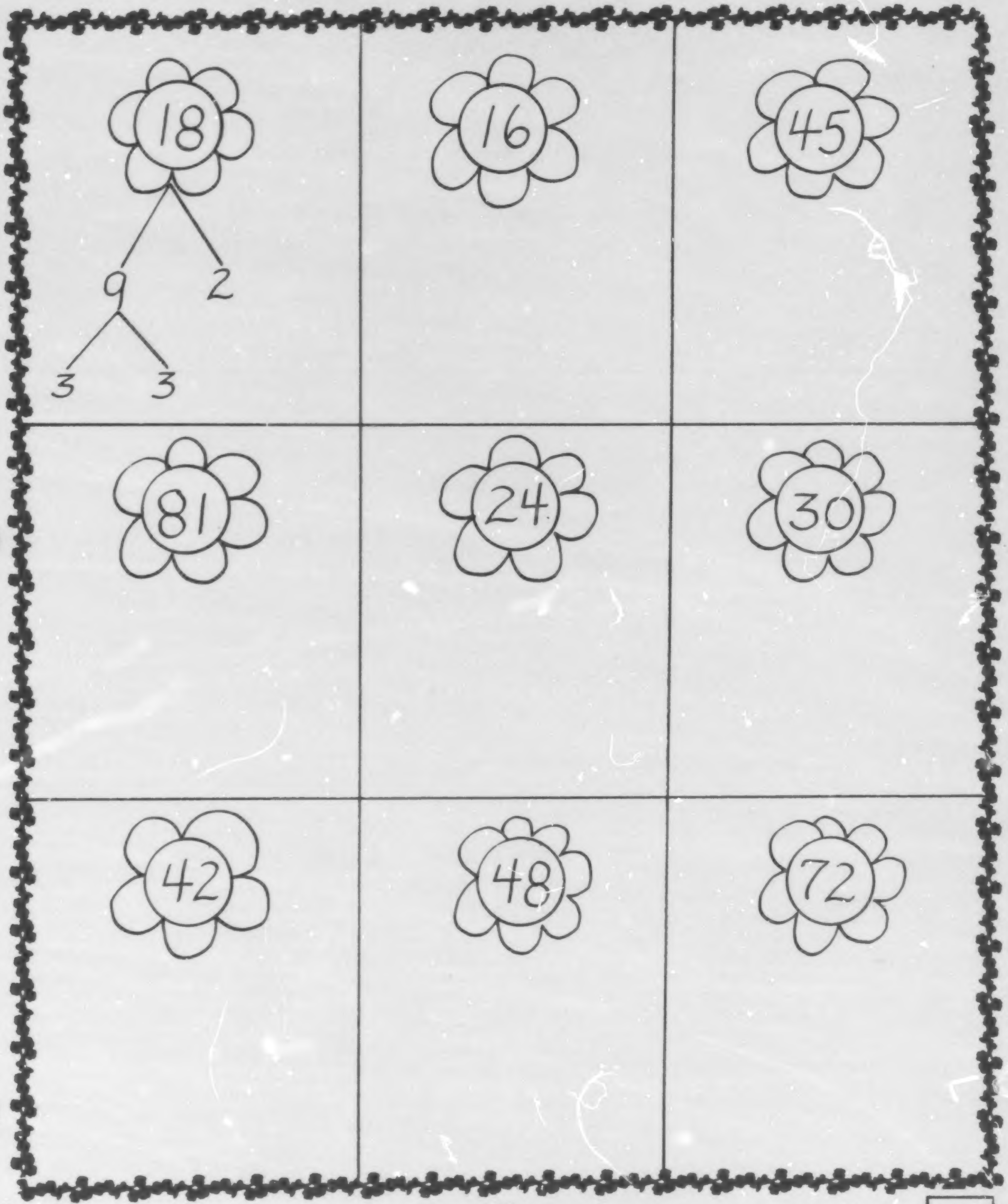
Color all the prime numbers red. Color all the composite numbers blue. What pattern did you make?


5
79
6
13
43
37
24
89
23
53
19
73
31
30
40
3
78
7
47
67
3
67
59
71
58
2
12
41
11
4
59
69
97
97
9
27
17
29
62
21
83
48
8
15
61
18
60
100
55
99

P.O. 5.01.04.03

NAME: ______________________________ CLASS: __________ DATE: ______

The number plant needs roots in order to grow.
Rename the number as a product of its primes.


18
9
2
3
3
16
45
81
24
30
42
48
72

Unit 44

5.05.03 DIVISION BY MULTIPLES OF 100

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.05.03.01B divide a dividend that is a multiple of 1,000 or 10,000 by a divisor that is a multiple of 100;

e.g.,

```
                           30
                      300)9000
     (300 x 30) --->      -9000
```

5.05.03.02B divide any 4- and 5-digit number using a divisor that is a multiple of 100 and check;

e.g.,

```
                   24 r276          check
              400)9876                400
 (20 x 400) ---> -8000               x 24
                  1876               1600
(+ 4 x 400) ---> -1600               8000
  24               276               9600
                                     +276
                                     9876
```

5.05.03.03B solve word problems related to skills learned in this module.

e.g.,

A restaurant worker had 10,750 forks to wash. He washed 100 in each load. How many loads did he have?

```
                          107 r50     check:
                    100)10,750           107
(100 x 100) ----->     10000            x100
                         750          10,700
(+ 7 x 100) ----->       700          +   50
 107                      50          10,750
```

He had 107 loads and 50 left over.

5.05.03

VOCABULARY

TERMS

multiple
divisor
dividend

GETTING STARTED

Play "Guess the Rule". Write the following on the chalkboard.

6 → 60   30 → 300
8 → 80   60 → 600
10 → 100   90 → 900

Say, "What did we do to the first number to get the second number?" (multiply by ten)

Repeat this procedure multiplying any 2- or 3-digit number by ten or one hundred.

Write $20\overline{)800}$ on the chalkboard. Ask a student to come to the chalkboard to solve this problem. Ask another student to check.

Repeat this procedure using multiples of ten for the divisor and multiples of one hundred for the dividend.

Say, "We can relate the patterns of multiplying by multiples of 10 and 100 to dividing by the same multiples. We know that division is the inverse (opposite) operation of multiplication. We can use multiplication to help us find quotients." Write the following on the chalkboard.

$$\begin{array}{r}6\\ \underline{\times 2}\end{array} \quad 2\overline{)12} \qquad \begin{array}{r}6\\ \underline{\times 20}\end{array} \quad 20\overline{)120} \qquad \begin{array}{r}6\\ \underline{\times 200}\end{array} \quad 200\overline{)1,200}$$

Repeat this procedure.

5.05.03

5.05.03.01 **divide a dividend that is a multiple of 1,000 or 10,000 by a divisor that is a multiple of 100**

STRATEGY 1: Write the following examples on the chalkboard.

$$800\overline{)4000} \qquad 4000 \div 800 = \square \qquad \begin{array}{r}\square\\ \underline{\times 800}\end{array}$$

Say, "When we multiply by multiples of one hundred, how many zeroes do we write in the product?" (2) Put a box around the two zeros.

e.g.,

$$\begin{array}{r}\square\\ \underline{\times 800}\\ 40\boxed{00}\end{array}$$

Say, "What is the missing factor? (5) If 5 is the answer to the multiplication example, it is also the answer to the division example since multiplication and division are opposite operations."

e.g.,

$$\begin{array}{r}5\\ 800\overline{)4000}\end{array} \qquad \begin{array}{r}5\\ \underline{\times 800}\\ 4000\end{array}$$

Repeat this procedure using other examples.

STRATEGY 2: Write $300\overline{)9000}$ on the chalkboard. Say, "We want to remove groups of 300 from 9,000. Can we remove any from 9? (No) ...from 90? (No) ...from 900? (Yes) Find the number of groups of 300 that can be removed from 900. Remember that the 3 is in the tens place and equals 30. Multiply 300 by 30, write the product in the example, and subtract to find how much of the 9,000 was removed."

e.g.,

$$\begin{array}{r}3\\ 300\overline{)9000}\\ \underline{-9000}\\ 0\end{array}$$

Say, "How can we show the 3 in the quotient means 30?" (Place a zero to its right.)

STRATEGY 2: cont'd

e.g.,

```
           30
     300)9000
        -9000
            0
```

Repeat this procedure.

5.05.03.02 **divide a 4- or 5-digit number by a divisor that is a multiple of 100 and check**

STRATEGY 1: Write 600)8795 on the chalkboard. Say, "Estimate the quotient to find the number of places in the quotient. We can use the think box method." Write the following on the chalkboard.

```
100 x 600 = 60,000 > 8795
 10 x 600 =  6,000 < 8795
```

Say, "There will be two places in the answer. Now we must find the digit to go in the tens place." Write the following on the chalkboard.

```
10 x 600 =  6,000 < 8795
20 x 600 = 12,000 > 8795
```

Say, "The digit in the tens place will be a 1. We know our answer will be between 10 and 19." Write the following on the chalkboard.

```
                    1
              600)8795
   10x600        -6000
                  2795
```

Say, "Now we must find the digit for the ones place. We have 2,795 left." Write the following on the chalkboard.

```
1 x 600 =  600 < 2795
2 x 600 = 1200 < 2795
3 x 600 = 1800 < 2795
4 x 600 = 2400 < 2795
5 x 600 = 3000 > 2795
```

5.05.03

STRATEGY 1: cont'd

Say, "The digit 4 will be in the ones place. Subtract the product of 4 x 600."

e.g.,

```
                  14r395
            600)8795
  (10x600)     -6000
                2795
   (4x600)     -2400
                 395
```

Say, "395 is the remainder. To check the example, multiply the divisor by the quotient and add the remainder."

e.g.,

```
   600
  x 14
  2400
  6000
  8400
  +395
  8795
```

STRATEGY 2: Write the following example on the chalkboard.

```
400)9876
```

Say, "I want to divide this amount of money evenly among 400 schools. Can I give each school a one thousand dollar bill? (No) I must regroup the 9 thousands as 90 hundreds. How many hundreds do I have in all? (98) Can I give each school a hundred dollar bill? (No) I must regroup the 98 hundreds as 980 tens. How many tens in all? (987) Can I give each school at least one ten? (Yes) How many tens can I give each school?" (2) Write 400)9876 on the chalkboard. Say, "Multiply 400 x 20 to see how much money we gave away. Subtract that amount to see how much we have left." Demonstrate at the chalkboard.

e.g.

```
                   2
            400)9876
  (20x400)     -8000
                1876
```

Say, "We still have $1,876 to give away. How many

STRATEGY 2: cont'd

tens do we have left? (187) Can we continue to give away tens? (No) We must exchange 187 tens for 1870 ones. How many ones are there in all? (1876) How many ones can we give each school? (4) Multiply 400 x 4 and subtract that amount from 1876."

Demonstrate at the chalkboard.

e.g.,

```
                 24 r276
            400)9876
 (20x400)      -8000
                1876
  (4x400)      -1600
                 276
```

Say, "Can we give an equal amount of money to each school from the 276 that is left? (No) 276 is the remainder. Let's check the answer."

e.g.,

```
 400
 x24
1600
8000
9600
+276
9876
```

Repeat this procedure using other examples.

5.05.03.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> An airplane traveled 3,000 miles. If it covered 600 miles each hour, how many hours did the trip take?

Say, "Which operation will we use to find the answer?" (division) Ask a student to write the number sentence on the chalkboard, e.g., $600\overline{)3000}$. Say, "What multiplication sentence can we use to help solve this problem?" (x 600 = 3,000) Write on the chalkboard.

```
x600
3000
```

STRATEGY 1: cont'd

Say, "We're multiplying by a multiple of 100, how many zeros should we enclose in a frame? (2) With that done, we can now solve x 6 = 30. What number belongs in the frame? (5) Write this as the answer to the division example. What does the five represent?" (5 hours)

STRATEGY 2:

Write a word problem on the chalkboard.
e.g.,

> At a pencil factory, pencils are placed in boxes of 500. How many boxes will there be after 12,500 pencils are boxed?

Ask a student to solve the example.
e.g.,

```
                   25 boxes
            500)12,500
 (20x500)      -10,000
                 2,500
  (5x500)       -2,500
                     0
```

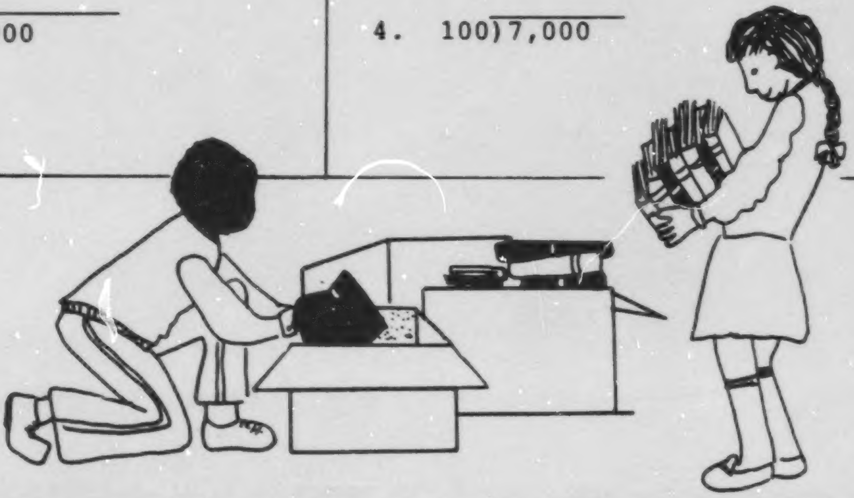
Say, "There will be 25 boxes of pencils."

P.O. 5.05.03.01

NAME:________________________ CLASS:________ DATE:________

Solve.

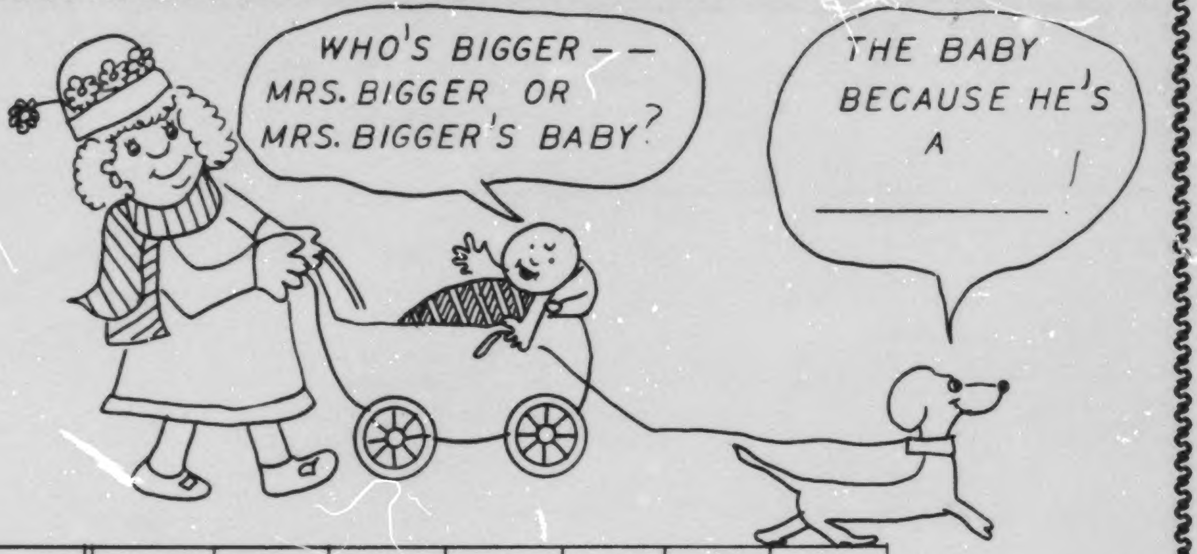
I.	1. $\begin{array}{r} \square \\ \times\ 600 \\ \hline 3,000 \end{array}$	$600\overline{)\,3,000}$
	2. $\begin{array}{r} \square \\ \times\ 300 \\ \hline 9,000 \end{array}$	$300\overline{)\,9,000}$
	3. $\begin{array}{r} \square \\ \times\ 500 \\ \hline 2,000 \end{array}$	$500\overline{)\,2,000}$
	4. $\begin{array}{r} \square \\ \times\ 200 \\ \hline 8,000 \end{array}$	$200\overline{)\,8,000}$
II.	1. $500\overline{)\,4,000}$	2. $200\overline{)\,6,000}$
	3. $600\overline{)\,3,000}$	4. $100\overline{)\,7,000}$



P.O. 5.05.03.02

NAME: ______________________________ CLASS: __________ DATE: ________

Solve each example.
Use the key to solve the riddle.


WHO'S BIGGER -- MRS. BIGGER OR MRS. BIGGER'S BABY?
THE BABY BECAUSE HE'S A ____________ !

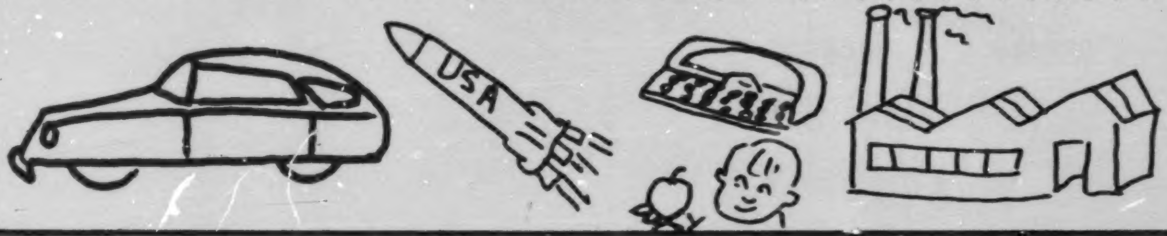
KEY	B	E	G	I	L	R	T
	27	200	210	145	7	76	240

$\begin{array}{r} 7 \\ 700\overline{)4900} \\ -4900 \\ \hline 0 \end{array}$ L	$200\overline{)29000}$ ____	$300\overline{)72000}$ ____	$400\overline{)96000}$ ____	$500\overline{)3500}$ ____	$400\overline{)80000}$ ____
$900\overline{)24300}$ ____	$600\overline{)87000}$ ____	$400\overline{)84000}$ ____	$100\overline{)21000}$ ____	$300\overline{)60000}$ ____	$900\overline{)68400}$ ____

P.O. 5.05.03.03

NAME: ______________________ CLASS; ________ DATE: ________

Solve each word problem.



1. One stadium has seats for 56,500 people. There are 200 sections. About how many people can be seated in each section?

2. A rocket travels 8,000 miles in 100 minutes after launch. How many miles is it traveling each minute?

3. A company spent $71,925 on 200 new typewriters. How much did each one cost?

4. A car factory needs 70,000 screws of one type to manufacture 400 cars. How many of these screws are needed for each car?

5. During one month, a school served 9,000 meals to its 500 students. About how many meals did each student have?

5.05.04 DIVISION BY 3-DIGIT DIVISORS

(3-4 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.05.04.01B estimate the quotients;

e.g.,

$242\overline{)8693}$ □ x 242 = 8693 8693 ÷ 242 = □

10 x 242 = 2420	2420 < 8693
20 x 242 = 4840	4840 < 8693
30 x 242 = 7260	7260 < 8693
40 x 242 = 9680	9680 > 8693

Therefore, □ > 30 and □ < 40.

5.05.04.02B divide a 4- 5- and 6-digit number by a 3-digit divisor and check;

e.g.,

```
                             35 r223     check
                         242)8693         242
(30 x 242) ------>          -7260        x 35
                             1433        1210
(+5 x 242) ------>          -1210        7260
 35                           223        8470
                                          223
                                         8693
```

5.05.04.03B solve word problems related to skills learned in this module.

e.g.,

The purple area at a football stadium contains 112 seat per row. They sold 5,824 tickets. There are no more tickets available in the purple section. How many rows will be occupied the day of the game?

```
                           52 rows     check
                      112)5824          112
(50 x 112) ------>       -5600         x 52
                           224          224
(+2 x 112) ------>        -224         5600
 52                          0         5824
```

VOCABULARY

TERMS

estimate
quotient
dividend
divisor

GETTING STARTED

Write 3746 on the chalkboard.

Say, "Let's round this number to the nearest hundred. What digit is in the hundreds place? (7) What digit is to the right of it? (4) Do we round down to 3,700 or up to 3,800? (down to 3,700) If the number to the right of the number we are rounding is 0 through 4, we round down. If the number is 5 through 9, we round up."

Repeat this procedure with other examples.

Write the following pattern of multiplication examples on the chalkboard.

10 X 351   40 X 351   70 X 351
20 X 351   50 X 351   80 X 351
30 X 351   60 X 351   90 X 351

Say, "When we multiply by ten or a multiple of ten, how many zeros do we place in the product? (1) After we place a zero in the product, we are really multiplying by a 1-digit number."

Ask the students to complete the examples on the chalkboard.

5.05.04

5.05.04.01 **estimate the quotients**

STRATEGY 1: Write the following example on the chalkboard.

e.g.,

$$242\overline{)8693}$$

Say, "We can use our knowledge of multiplication to help us estimate the quotient. Since 8,693 ÷ 242 = □ then □ x 242 = 8,693. Let's try some possibilites for □. If □ = 1, then 1 x 242 is 242. Is 242 less than 8,693? (Yes) Can we take out more than one group of 242 from 8,693? (Yes) Can we take out more than 10 groups of 242? (Yes) If □ = 100, 100 x 242 = 24,200. Is 24,200 greater or less than 8,693? (greater) Can we take out 100 groups of 242? (No) Therefore, we know that the quotient must be larger than 10 but smaller than 100. Since we know the quotient is a number between 10 and 100, we can come closer to estimating its value by using the following pattern." Write the following on the chalkboard.

e.g.,

$$\begin{aligned} 10 \times 242 &= 2420 < 8693 \\ 20 \times 242 &= 4840 < 8693 \\ 30 \times 242 &= 7260 < 8693 \\ 40 \times 242 &= 9680 > 8693 \end{aligned}$$

Say, "Since 9,680 is greater than 8,693 we cannot remove 40 groups of 242. But since 7,260 is less than 8,693, we can remove more than 30 groups of 242. The quotient must be a number between 30 and 40."

Repeat this procedure with other examples.

STRATEGY 2: Write the following example on the chalkboard.

e.g.,

$$153\overline{)32,756}$$

Say, "We can estimate the quotient by finding the first digit of the quotient. Can we remove any groups of 153 from 3? (No) ...from 32? (No) ...from

STRATEGY 2: cont'd

327? (Yes) How many?" (2) Write $\begin{array}{r} 2 \\ 153\overline{)32,756} \end{array}$ on the chalkboard. Say, "When we compute the example, we must keep in mind that the quotient will be around 200."

Repeat this procedure with other examples.

5.05.04.02 **divide a 4-, 5-, 6-digit number by 3-digit divisor and check**

STRATEGY 1: Write the following on the chalkboard.

$$375\overline{)9352} \qquad \begin{array}{rcl} 1 \times 375 = & 375 & < 9352 \\ 10 \times 375 = & 3,750 & < 9352 \\ 100 \times 375 = & 37,500 & > 9352 \end{array}$$

Say, "Since 9,352 is more than 3,750 but less than 37,500, the quotient must be greater than 10 but less than 100." Write the following on the chalkboard.

e.g.,

$$\begin{array}{rcl} 10 \times 375 = & 3,750 & < 9352 \\ 20 \times 375 = & 7,500 & < 9352 \\ 30 \times 375 = & 11,250 & > 9352 \end{array}$$

Ask the students for the products (3,750, 7,500, 11,250). Say, "Since 9,352 is between 7,500 and 11,250, the quotient will be between 20 and 30. We take 20 groups of 375 out of 9,352." Demonstrate on the chalkboard.

e.g.,

$$\begin{array}{rr} & 2 \\ & 375\overline{)9352} \\ (20 \times 375) & \underline{-7500} \\ & 1852 \end{array}$$

Say, "How many groups of 375 can we take from 1,852? The next estimate must be lower than 10 since 10 x 375 is greater than 1,852." Multiply and subtract.

STRATEGY 1: cont'd

e.g.,

```
                24
           375)9352
 (20x375)  -7500
            1852
  (4x375)  -1500
             352
```

Say, "Add the partial quotients (20 + 4) and write the quotient and remainder (24 r352). Does this agree with our estimate? (Yes) We check the example by multiplying."

e.g.,

(24 x 375) + 352 = 9,352

STRATEGY 2: Write 625)27,924 on the chalkboard. Say, "Can we remove any groups of 625 from 2? (No) ...from 27? (No) ...from 279? (No) ...from 2,792? (Yes) How many? (4) Write a 4 in the tens place." Write 625)27,924 on the chalkboard. Say, "Do the multiplication and subtraction remembering that 4 in the tens place means 40."

e.g.,

```
                  40
           625)27,924
 (40x625)  -25,000
             2,924
```

Say, "Find the number of groups of 625 that can be removed from 2,924." Write the following on the chalkboard.

e.g.,

```
                 44r424
           625)27,924
 (40x625)  -25,000
             2,924
  (4x625)   -2,500
               424
```

Say, "Does the quotient agree with our estimate?" (Yes) Ask the students to check the example using multiplication.

e.g.,

(44 x 625) + 424 = 27,924

5.05.04.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> The purple area at a stadium contains 112 seats per row. There are 5,824 seats in all. How many rows are there?

Say, "What number sentence can we use to find the answer?" Elicit the division sentence and write it on the chalkboard.

e.g.,

$112\overline{)5824}$

Ask the students to estimate, solve and check the example. Say, "There are 52 rows in the purple area."

STRATEGY 2: Write the following problem on the chalkboard.

> A new library opened with 15,237 books. Each large bookcase in the library holds 276 books. If the books are divided evenly among the bookcases, how many bookcases will be needed?

Say, "Which operation will we use to solve this problem?" (division) Ask a student to write the division sentence on the chalkboard, e.g., $276\overline{)15,237}$. Ask the students to estimate and complete the division.

e.g.,

```
                 55r57
           276)15,237
 (50x276)     -13,800
                1,437
  (5x276)      -1,380
                   57
```

Say, "55 represents the number of bookcases which will be filled, but that the remaining 57 books will require another bookcase. Therefore, if this were a real situation, 56 book cases would be needed." Ask the students to check the example.

e.g.,

(55 x 276) + 57 = 15,237

P.O. 5.05.04.01

NAME: ______________________ CLASS: ________ DATE: ________

Estimate the quotients.

$242\overline{)86931}$

$624\overline{)24235}$

$415\overline{)44100}$

$105\overline{)5200}$

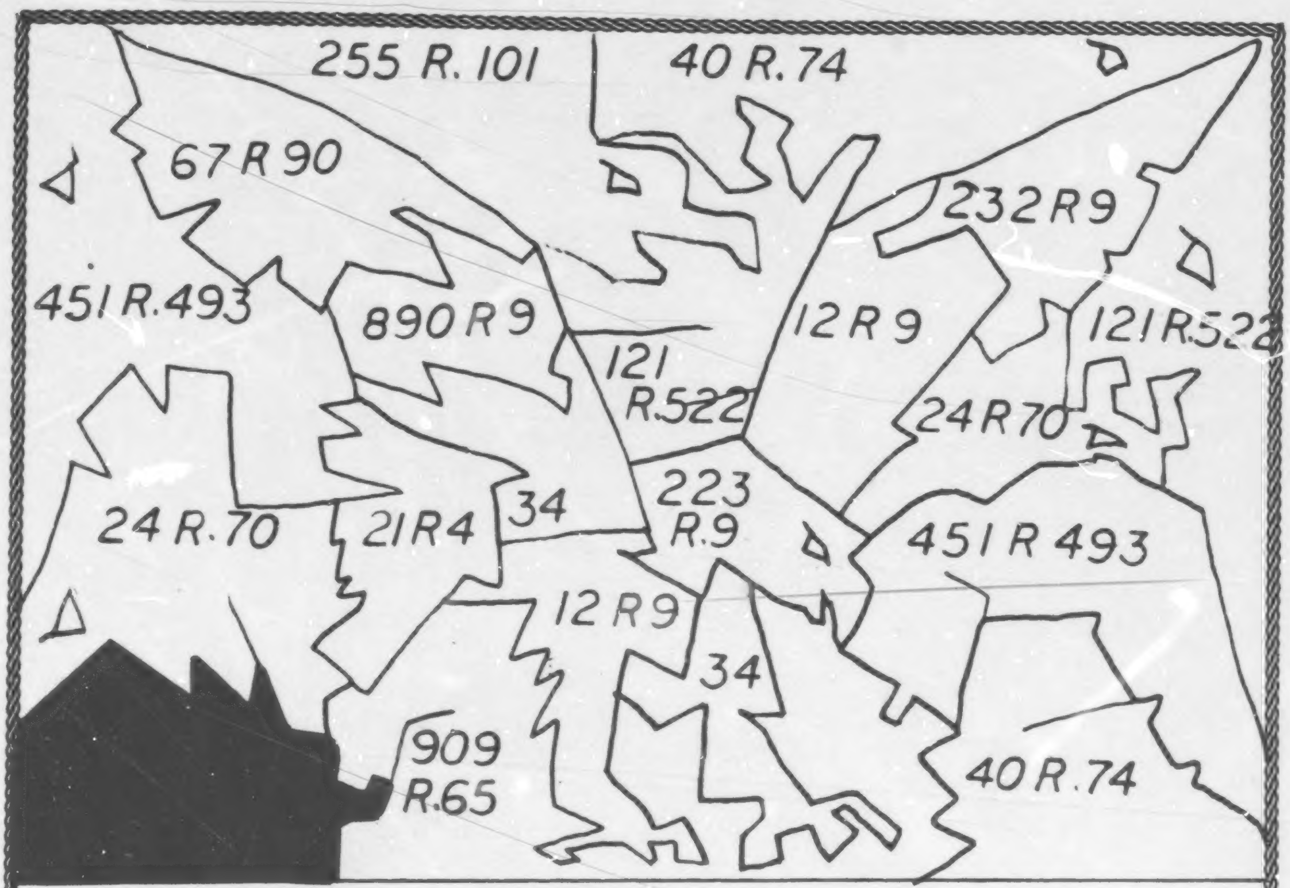
$620\overline{)158620}$

$674\overline{)121032}$

P.O. 5.05.04.02

NAME: ______________________ CLASS: ________ DATE: ________

Solve the problems. Shade the spaces of the numbers that match the quotients to the problems.


255 R. 101
40 R. 74
67 R 90
232 R 9
451 R. 493
890 R 9
12 R 9
121 R.522
121 R.522
24 R 70
24 R. 70
21 R 4
34
223 R.9
451 R 493
12 R 9
34
909 R.65
40 R. 74

Example

```
     255R101
256)65381
    512
    14181
    1280
     1381
     1280
      101
```

315)7,730

803)97,685

663)26,594

213)193,682

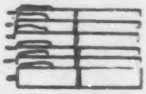
714)322,507

P.O. 5.05.04.03

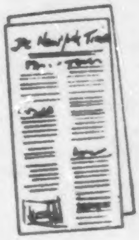
NAME: ______________________________ CLASS: __________ DATE: ________

Solve each problem.

1. A factory packages pens by the gross. There are 144 pens in a gross. How many gross can be made from 15,500 pens?



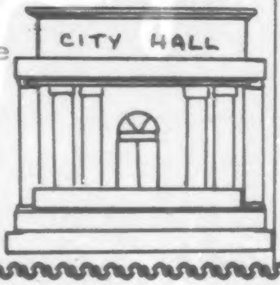
2. During one year, a girl delivers 8,760 newspapers. If she works every day and delivers the same number each day, how many does she deliver each day?



3. A runner is training for a 440 yard race. How many 440 yard runs will he do if he runs 16,280 yards one day?

4. A certain swimming pool is 150 feet long. If a swimmer swims 3,750 feet, how many laps of the pool will he do?

5. The cost of a new town hall for a small town is to be $177,750. If the cost is to be shared equally among the 395 families in the town, how much will each family have to pay?



5.12.04 PROBABILITY

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

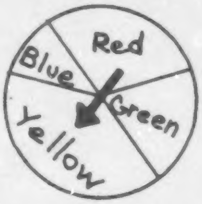
5.12.04.01A identify events that are impossible, certain, and that sometimes occur;
e.g.,

Monday follows Tuesday. - impossible
Tuesday follows Monday. - certain
It rains on Tuesday. - sometimes

5.12.04.02A express probability as a fraction;
e.g.,

$$\text{The estimated probability of an event's happening} = \frac{\text{The number of times the event happens}}{\text{The total number of experiments}}$$

5.12.04.03A recognize that some experiments have outcomes that are not equally likely;
e.g.,



The probability that the pointer will land on yellow is greater than the probability that the pointer will land on blue.

5.12.04.04A represent and count the number of elements in the sample space of an experiment;

e.g.,

Toss a nickel and a dime. List the possible outcomes.

NICKEL	Heads	Heads	Tails	Tails
DIME	Tails	Heads	Tails	Heads

*5.12.04.05A conduct probability experiments using an increasing number of trials so that the results become more reliable.

e.g.,

Spinning a coin 20 times may render a probability estimate of 0.40 that heads will turn up. Spinning the coin 100 times will render a probability estimate closer to 0.50.

5.12.04

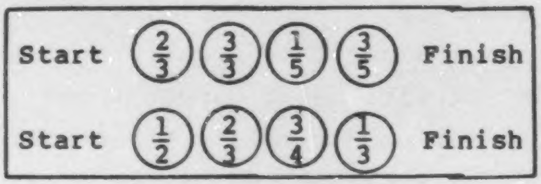
VOCABULARY

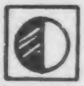
TERMS

numerator
denominator
probable
certain
impossible
sometimes

GETTING STARTED

Divide the class into two teams. Prepare and distribute the following.



Prepare cards showing a picture of a fraction, e.g.,  Display a card. Ask one student from each team to identify the fraction. The student who identified the fraction makes an X in the circle with $\frac{1}{2}$ on his/her team game board. The game continues in this manner and the first team to have an X in each circle wins the game.

Write the following terms and sentences on the chalkboard. e.g.,

impossible - never happens
certain - always happens
sometimes - occurs some of the time

A day has 24 hours.	(certain)
On Mondays it rains.	(sometimes)
Elephants can fly.	(impossible)
Dogs like to run.	(sometimes)
Stars are far.	(certain)
3 is greater than 7.	(impossible)

Ask a student to read the sentence and choose the term that best describes the sentence.

5.12.04

5.12.04.01 **identify events that are impossible, certain and that sometimes occur**

STRATEGY 1: Prepare a box, four red and four blue blocks. Write the following on the chalkboard, e.g., impossible, an event that will never happen; certain, an event that will always happen; sometimes, an event that will happen part of the time.

Place the four red blocks in the box. Say, "What are the chances of picking a red block? (It is certain.) What are our chances of picking a blue block? (Impossible, it will never happen.) Now we are going to change the conditions." Place four blue blocks in the box with the red blocks. Ask several students to pick blocks. Say, "What are our chances of picking a blue block? (Sometimes) What are our chances of picking a red block?" (Sometimes)

STRATEGY 2: Write the following words on the chalkboard: certain, impossible, sometimes. Say, "Something that is certain will always occur, something that is impossible will never occur, and some things happen some of the time."

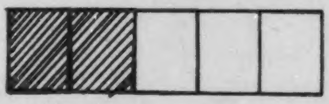
Ask four boys to come to the front of the classroom. Say, "If I close my eyes, what are the chances that I will tap a boy? (It is certain.) If I close my eyes, what are the chances of tapping a girl? (It is impossible.) We are going to change our conditions." Ask four girls to come to the front of the room. Say, "We now have a set of four boys and four girls. What are my chances of closing my eyes and picking a boy?" (sometimes) Demonstrate that sometimes you select a boy and sometimes you select a girl.

5.12.04

5.12.04.02 **express probability as a fraction**

STRATEGY 1: Prepare a set of playing cards. Draw the following on the chalkboard.

e.g.,



Ask a student to name the fraction this picture represents. ($\frac{2}{5}$)

Display five playing cards: two Kings, a Jack, a Queen and an Ace. Place the five cards face down and ask students to pick the cards one at a time. Say, "How many cards were picked? (5) How many Kings?" (2) Write the following on the chalkboard.

e.g.,

$$\frac{\text{The number of Kings picked}}{\text{Total number picked}} = \frac{2}{5}$$

Say, "We can express the probability of picking a King as a fraction as $\frac{2}{5}$." Repeat this procedure for the other cards.

STRATEGY 2: Prepare and display five blocks, three red and two yellow. Place all five blocks in a box. Ask five students to each pick one block. Say, "How many blocks were red? (3) How many blocks in all? (5) What is the relationship between red blocks and the number of blocks in all? (3 out of 5) Is there a way to express this relationship as a fraction? ($\frac{3}{5}$) What is the probability of choosing a yellow block?" ($\frac{2}{5}$)

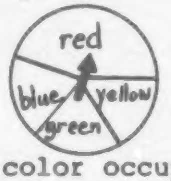
Repeat this procedure changing the number of blocks.

5.12.04

5.12.04.03 **recognize that some experiments have outcomes that are not equally likely**

STRATEGY 1: Construct a spinner.

e.g.,



Say, "Which color occupies the greatest portion of the circle? (red) Does that mean the spinner will always stop on red? Is it certain? (No) It is likely that the spinner will land on red because a large portion of the circle is red. The chance of landing on yellow, green or blue is smaller. Why?" (Each color occupies a smaller section of the circle.) Ask students to spin the spinner and record the results.

e.g.,

Red 8, Yellow 2, Blue 2, Green 3

Say, "Do these results support what we thought would happen?" (Yes)

STRATEGY 2: Ask the first child in each row to write his name on a small piece of paper. Ask the first student in the first row to write his name on five strips of paper. Place all the strips in a box. Say, "Whose name has the best chance of being picked? (Jose, because his name is written five times.) Does that mean that Jose will always be picked? Is it certain?" (No, for it to be certain, all the strips would have to say Jose.) Ask different students to pick a name and write the name picked on the chalkboard, keeping a tally.

e.g.,

Jose	8	~~////~~ ///
Chris	2	//
Willie	2	//
Carlos	2	//
Maria	1	/

STRATEGY 2: cont'd Say, "What do these results show?" (Because there are more slips of paper with the name Jose, the probability of picking Jose is greatest.)

5.12.05.04 **represent and count the number of elements in the sample space of an experiment**

STRATEGY 1: Divide the class into four groups. Give each group two coins, a nickel and a dime. Draw the following chart on the chalkboard.

Nickel	
Dime	

Say, "Toss the two coins and record the results in the chart."

e.g.,

Nickel	H	H	T	T	H
Dime	T	H	T	H	T

Ask the groups to compare their results with the other groups. Ask the students to name all of the possible outcomes of this experiment, e.g., nickel-head and dime-head, nickel-tail and dime-head, ... Say, "Let's list all of the possible outcomes on this chart on the chalkboard." Draw the following chart.

Nickel • •
Dime • •
T H

Say, "We call this chart a sample space. It shows all of the possible outcomes for our experiment of tossing two coins. What are the possible outcomes shown on the chart? (TT, TH, HH, HT) How many are there?" (4)

Repeat this procedure using other experiments.

5.12.04

STRATEGY 2: Divide the class into groups of three. Give each group four cards of one suit, e.g., 2, 3, 4, 5 of hearts. Ask one student from each group to choose a card. Compare the results of each group. Ask the students to replace the card and repeat the procedure with another student. Say, "What are all of the possible outcomes for this experiment? (2♡, 3♡, 4♡, 5♡) We call a chart of all of the possible outcomes a sample space. We write all outcomes on the horizontal part of the chart and all items on the vertical part."

e.g.,

card   •   •   •   •
        2♡ 3♡ 4♡ 5♡

Say, "The dots in the chart show each outcome. How many outcomes are there?" (4)

Encourage the groups to compare their results. Say, "If the probability of picking a certain card is equal for all groups, shouldn't the outcome be the same?" (Yes, the probability is the same but for the results to be more even we would have to do many more experiments, more picks.)

5.12.04.05 **conduct probability experiments using an increasing number of trials so that the results become more reliable**

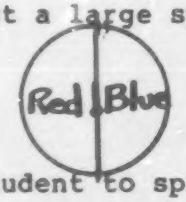
STRATEGY 1: Prepare pennies. Divide the class into groups of three. Give each group a penny. Say, "Conduct ten tosses with the penny and record your results. e.g., six heads and four tails, seven tails and three heads. Why are our answers different? Conduct forty more tosses and record your results.

STRATEGY 1: cont'd

e.g., twenty-eight heads, twenty-two tails; twenty-seven tails, twenty-three heads. The results are more uniform than before but still vary. The greater the number of trials, the more similar the results."

STRATEGY 2:

Construct a large spinner.
e.g.,



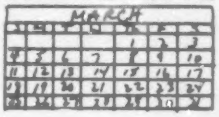
Ask a student to spin the spinner ten times. Ask another student to record the results, e.g., seven red, and three blue. Say, "These results are not what I expected. There are two equal spaces so the probability of getting red or blue should be even. We must perform more experiments." Ask another student to spin the spinner twenty times. Ask another student to record the results, e.g., seventeen reds, thirteen blues. Say, "The results are closer but still are not even. By increasing the number of trials, the results become more reasonable."

P.O. 5.12.04.01

NAME:______________________________CLASS:_________DATE:_______

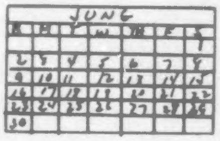
Write the appropriate term - impossible,certain, sometimes - after each sentence.

1) Monday follows Tuesday.



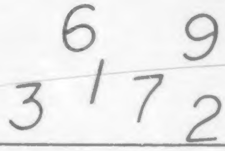
2) 8¢ is less than 4¢.

3) January comes before May.

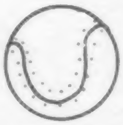


4) Dogs like to run.

5) 10 is an even number.

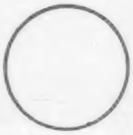


6) Boys like baseball.



7) Fire is hot.

8) Circles are round.



9) 47 is more than 74.

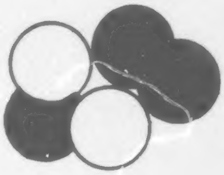
P.O. 5.12.04.02

NAME:____________________ CLASS:________ DATE:________

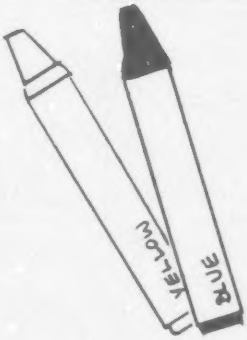
Express the probability as as a fraction.

1. Thirteen of the 20 children in a class are boys. What is the probability of picking a boy?

2. Three yellow balls and two orange balls in a bag. What is the probability of picking an orange ball?



3. There are 7 red crayons, 6 yellow crayons and 6 blue crayons in a box. What is the probability of picking a red crayon?



4. You have a nickel. What is the probability of tossing a head?

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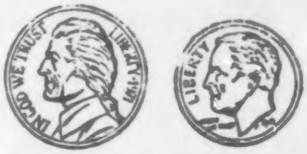
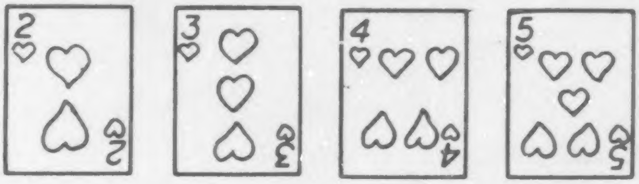
P.O. 5.12.04.04

NAME: ______________________ CLASS: ________ DATE: _______



1. If we tossed these coins what are the possible outcomes?

   Record the results in a sample space.



2. What are the possible outcomes if a person selected 1 card?

   Show the results in a sample space.

P.O. 5.12.04.05

NAME: ______________________ CLASS: ________ DATE: ________

Experiment ______________________

____

____

10 trials	40 trials

5.06.05 ADDITION OF FRACTIONS WITH UNLIKE DENOMINATORS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.05.01A find the least common denominator;

e.g.,

$$\frac{1}{12} + \frac{1}{6} \qquad \frac{1}{6} \times \frac{2}{2} = \frac{2}{12}$$

5.06.05.02A add mixed numbers with unlike denominators and rename in simplest form;

e.g.,

$$\begin{array}{rcccccl} 2\frac{1}{2} & = & \frac{1}{2} \times \frac{3}{3} & = & \frac{3}{6} & = & 2\frac{3}{6} \\ \underline{+\ 3\frac{2}{3}} & = & \frac{2}{3} \times \frac{2}{2} & = & \frac{4}{6} & = & \underline{+3\frac{4}{6}} \\ & & & & & & 5\frac{7}{6} = 6\frac{1}{6} \end{array}$$

5.06.05.03A add several fractions and/or mixed numbers and rename in simplest form;

e.g.,

$$\begin{array}{rcccl} \frac{1}{3} & = & \frac{1}{3} \times \frac{4}{4} & = & \frac{4}{12} \\ \frac{1}{4} & = & \frac{1}{4} \times \frac{3}{3} & = & \frac{3}{12} \\ \underline{+\ \frac{1}{6}} & = & \frac{1}{6} \times \frac{2}{2} & = & \underline{\frac{2}{12}} \\ & & & & \frac{9}{12} = \frac{3}{4} \end{array}$$

5.06.05.04A solve word problems related to skills learned in this module.

e.g.,

Marie wanted a special snack. She decided on a nut and raisin mixture. She went to the store and bought $1\frac{1}{2}$ lbs. of raisins and $2\frac{1}{4}$ lbs. of mixed nuts. How many pounds did she buy in all?

$$\begin{array}{rcl} 1\frac{1}{2} & = & 1\frac{2}{4} \\ \underline{+\ 2\frac{1}{4}} & \underline{=} & \underline{2\frac{1}{4}} \\ & & 3\frac{3}{4} \text{ lbs.} \end{array}$$

5.06.05

VOCABULARY

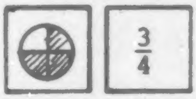
TERMS

denominator
numerator
common denominator

GETTING STARTED

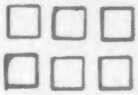
Prepare two sets of cards. One set with fractional representations and the second set with fractional numbers.

e.g.,



Place the cards face down in two rows.

e.g.,



Divide the class into two teams. Play "Concentration". Ask the first student on Team A to select one card from each row. If the cards match, the team keeps the set of cards. If the cards do not match they are returned to their original position. Play continues until all of the cards have been claimed. The team with the greatest number of cards wins the game.

Write the following examples on the chalkboard.

$$\frac{1}{4} + \frac{2}{4} = \square \qquad \frac{3}{8} + \frac{2}{8} = \square \qquad \begin{array}{r} \frac{1}{5} \\ +\frac{4}{5} \\ \hline \square \end{array}$$

Point to the first example. Say, "When we add fractions the numerators are added but the denominators remain the same. The denominator does not change because we performed addition." Ask the students to add the examples. Say, "Be sure your answer is in the simplest form."

5.06.05

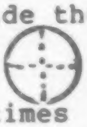
5.06.05.01 find the least common denominator

STRATEGY 1: Write $\frac{1}{6}$ and $\frac{1}{8}$ on the chalkboard. Say, "To find the least common denominator of two fractions, we look at the larger denominator first (8). Next we see if the smaller denominator is a multiple of the larger denominator. Is 6 a multiple of 8? (No) What is the next multiple of 8? (16) Is 6 a multiple of 16?" (No) Continue this procedure through 24. Say, "Since 6 is a multiple of 24, 24 is our new denominator." Write the following on the chalkboard.

$$\frac{1}{6} = \frac{\square}{24} \qquad \frac{1}{8} = \frac{\square}{24}$$

Say, "What number times 6 equals 24? (4) Multiply the numerator by 4. ($\frac{4}{24}$) What number times 8 equals 24? (3) What is the second new fraction?" ($\frac{3}{24}$)

Repeat this procedure using other pairs of fractions.

STRATEGY 2: Say, "If I had one pie that was cut into halves and another pie that was cut into fourths, how many pieces would I have altogether? (6) If I gave six people one slice each, would everyone get the same amount of pie? (No) What must we do to the pies so that each person gets the same amount?" Divide the pie; cut into halves and into fourths, e.g., 

Write $\frac{1}{2}$ and $\frac{1}{4}$ on the chalkboard. Say, "Sometimes it is necessary to rename fractions so that they have the same denominator. One way to find the common denominator is to list the multiples of each denominator."

e.g.,

2: 2 4 6 8 10 12
4: 4 8 12 16 20 24

Say, "What is the first multiple that is common to both numbers? (4) 4 is the common denominator. We

STRATEGY 2: cont'd

do not have to change $\frac{1}{4}$ but we must change $\frac{1}{2}$." Write $\frac{1}{2} = \frac{}{4}$ on the chalkboard. Say, "What number times 2 equals 4? (2) Multiply the numerator by 2. What is the new fraction?" $(\frac{2}{4})$

Repeat this procedure with other fractions.

5.06.05.02 **add mixed numbers with unlike denominators and rename in simplest form**

STRATEGY 1: Write $2\frac{1}{6}$ on the chalkboard.

$$\begin{array}{r} 2\frac{1}{6} \\ +\ \frac{1}{8} \\ \hline \end{array}$$

Say, "Can we add these fractions? (No) We must find the common denominator for 6 and 8." List the multiples of each on the chalkboard.

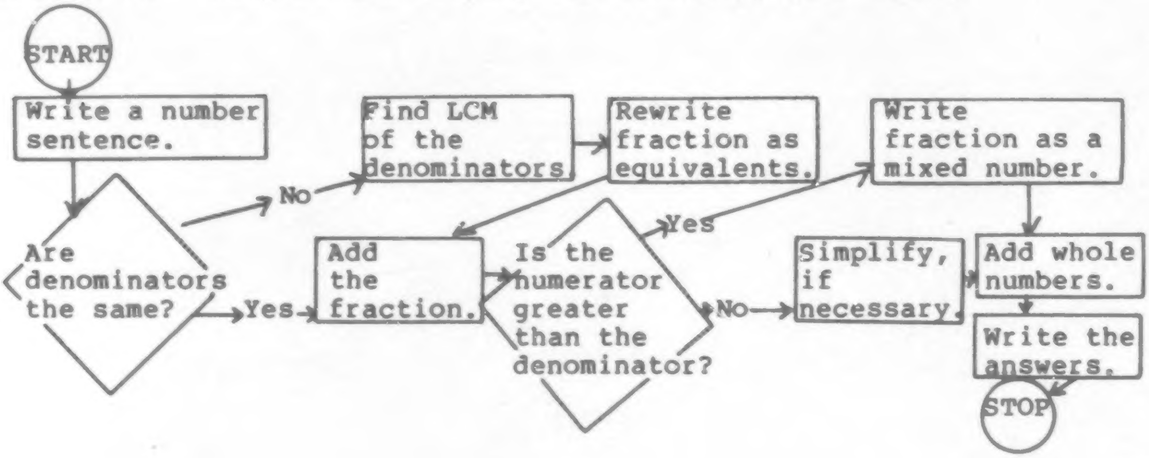
e.g.,

6: 6, 12, 18, 24, 30, 36
8: 8, 16, 24, 32, 40, 48

Say, "What is the least common denominator for 6 and 8? (24) Change $\frac{1}{6}$ and $\frac{1}{8}$ to fractions with denominators of 24. $(\frac{4}{24}, \frac{3}{24})$ Add $\frac{3}{24}$ and $\frac{4}{24}$. $(\frac{7}{24})$ Then, add the 2 whole units." $(2\frac{7}{24})$

Repeat this procedure for mixed numbers.

STRATEGY 2: Prepare and display the following flow chart.


START
Write a number sentence.
Are denominators the same?
No
Find LCM of the denominators.
Rewrite fraction as equivalents.
Write fraction as a mixed number.
Yes
Add the fraction.
Is the numerator greater than the denominator?
Yes
No
Simplify, if necessary.
Add whole numbers.
Write the answers.
STOP

5.06.05

STRATEGY 2: cont'd

Write $3\frac{1}{4} + \frac{1}{5} = \square$ on the chalkboard. Point to the flow chart. Say, "What is the first step? (Write a number sentence.) Do we have one? (Yes) What do we do next? (Check denominators.) If the denominators are the same, what do we do? (Add the fractions.) If they are not the same, what must we do? (find LCM) After finding the LCM what must we do? (Rewrite the fractions as equivalents.) Then, we add the fractions. After we add, we check to see if we need to simplify or rename the fraction. Add the whole numbers to complete the example."

Ask the students to use the flow chart to complete the example.

Repeat the procedure using other examples.

5.06.05.03 **add several fractions and/or mixed numbers and rename in simplest form**

STRATEGY 1: Prepare and display fractional pieces showing $2\frac{1}{2}$, $\frac{1}{3}$ and $1\frac{1}{6}$. Write the fraction next to each representation. Say, "Is it possible to add these fractions in their present form? (No) We must find the least common denominator." (6) Rewrite the example on the chalkboard.

e.g.,

$$\begin{array}{rcr} 2\frac{1}{2} \times \frac{3}{3} & = & 2\frac{3}{6} \\ \frac{1}{3} \times \frac{2}{2} & = & \frac{2}{6} \\ \underline{1\frac{1}{6} \times \frac{1}{1}} & = & \underline{1\frac{1}{6}} \end{array}$$

Ask a student to use the fractional parts to show the new example. Ask another student to add the

STRATEGY 1: cont'd

fractional part of the example. ($\frac{6}{6}$) Ask a third student to add the whole numbers. (3) Ask a student to rename $\frac{6}{6}$. Say, "We have 3 wholes plus 1 more whole which equal 4 wholes."

STRATEGY 2:

Prepare fractional parts (4 wholes, $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{7}{6}$) for demonstration. Write the following problem on the chalkboard.

$$\begin{array}{r} 2\frac{1}{2} \\ \frac{2}{3} \\ \underline{+2\quad} \end{array}$$

Say, "Copy the problem into your notebook." Tape the display to the chalkboard. Say, "Can we add these numbers the way they are? (No) We must find the least common denominator. (6) Change $\frac{1}{2}$ and $\frac{2}{3}$ to sixths. How can we do that?" (Multiply $\frac{1}{2}$ x $\frac{3}{3}$ and $\frac{2}{3}$ x $\frac{2}{2}$.) Rewrite the example on the chalkboard and ask the students to copy it in their notebooks.

e.g.,

$$\begin{array}{rcr} 2\frac{1}{2} & = & 2\frac{3}{6} \\ \frac{2}{3} & = & \frac{4}{6} \\ \underline{+2\quad} & = & \underline{2\quad} \end{array}$$

Say, "Since we changed the example, we must now change the material. Ask a student to display the new example and add the fractions ($\frac{7}{6}$) and the whole numbers. (4) Write $4\frac{7}{6}$ on the chalkboard. Say, "What do you notice about $\frac{7}{6}$?" (It's more than a whole.) Use the material to show that the $\frac{7}{6}$ equals $1\frac{1}{6}$. Ask a student to complete the example. ($5\frac{1}{6}$)

5.06.05

5.06.05.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> Marie wanted a special snack. She decided on a nut and raisin mixture. She went to the store and bought $1\frac{1}{2}$ lbs. of raisins and $2\frac{1}{4}$ lbs. of mixed nuts. How many pounds did she buy in all?

Say, "What are the key words? (how many, in all) What operation will we use?" (addition) Write the number sentences and solve this problem. Be sure to rename in simplest form and label the answer.

e.g.,

$$1\frac{1}{2} + 2\frac{1}{4} = 1\frac{2}{4} + 2\frac{1}{4} = 3\frac{3}{4} \text{ lbs.}$$

STRATEGY 2: Write the following problem on the chalkboard.

e.g.,

> Susan bought $2\frac{4}{8}$ yards of ribbon. Her sister bought $6\frac{1}{4}$ yards of ribbon. How many yards of ribbon did they buy in all?

Say, "Estimate the answer. Solve the problem. Label your answer."

e.g.,

$$\begin{array}{rcl} 2\frac{4}{8} & = & 2\frac{4}{8} \\ \underline{+\ 6\frac{1}{4}} & = & \underline{6\frac{2}{8}} \\ & & 8\frac{6}{8} = 8\frac{3}{4} \text{ yds.} \end{array}$$

P.O. 5.06.05.01

NAME:____CLASS:_________DATE:________

Rename each pair of fractions using the least or lowest common denominator.

1) $\frac{2}{3} = \frac{\square}{12} = \frac{8}{12}$ $\frac{1}{4} = \frac{\square}{12} = \frac{3}{12}$	6) $\frac{1}{2}$ $\frac{5}{8}$
2) $\frac{1}{3}$ $\frac{5}{6}$	7) $\frac{2}{5}$ $\frac{2}{4}$
3) $\frac{1}{4}$ $\frac{1}{8}$	8) $\frac{1}{3}$ $\frac{3}{5}$
4) $\frac{1}{2}$ $\frac{1}{3}$	9) $\frac{1}{3}$ $\frac{2}{7}$
5) $\frac{3}{4}$ $\frac{2}{5}$	10) $\frac{3}{4}$ $\frac{2}{3}$

P.O. 5.06.05.02

NAME:________________________ CLASS:__________ DATE:__________

Add. Express your answer in the simplest terms. If the answer is listed on the bottom color the circle. Connect the colored circles.

$$\begin{array}{r} 2\frac{1}{2} \\ +\ 3\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{7} \\ +\ \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 4\frac{1}{3} \\ 2\frac{1}{4} \\ +\ 7\frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 2\frac{1}{2} \\ +\ 7\frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 8\frac{4}{10} \\ 2\frac{3}{5} \\ +\ \frac{1}{4} \\ \hline \end{array}$$

$$7\frac{2}{7} + 8\frac{2}{7}$$

$$\begin{array}{r} 6\frac{3}{5} \\ +\ 5\frac{2}{5} \\ \hline \end{array}$$

$$\frac{3}{5} + \frac{2}{4} + \frac{1}{2}$$

$$7 + \frac{3}{6} + 2\frac{1}{2}$$

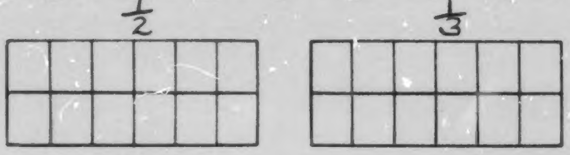
ANSWERS:

$12 \quad 10\frac{1}{5} \quad \frac{16}{21} \quad 5\frac{5}{6} \quad 13\frac{3}{4} \quad 11\frac{1}{4}$

P.O. 5.06.05.03

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Add the fractions. Rename when necessary.



Put xs in $\frac{1}{2}$ of the squares of the first rectangle.

How many spaces did you fill?

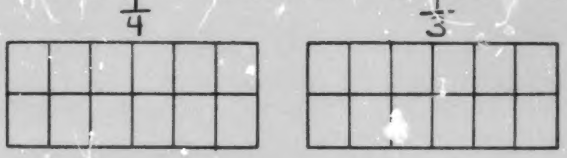
____

Put Xs in $\frac{1}{3}$ of the parts of the second rectangle.

How many spaces did you fill?

____

$$\begin{array}{r} \frac{1}{2} = \frac{\square}{12} \\ + \frac{1}{3} = \frac{\square}{12} \\ \hline \frac{\square}{12} \end{array}$$



Put xs in $\frac{1}{4}$ of the parts of the first rectangle.

How many spaces did you fill?

____

Put xs in $\frac{1}{3}$ of the parts of the second rectangle.

How many spaces did you fill?

____

$$\begin{array}{r} \frac{1}{4} = \frac{\square}{12} \\ + \frac{1}{3} = \frac{\square}{12} \\ \hline \frac{\square}{12} \end{array}$$

$$\begin{array}{r} \frac{1}{5} \\ \frac{1}{4} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 1\frac{1}{6} \\ \frac{2}{3} \\ + 3\frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{4}{5} \\ \frac{1}{3} \\ + \frac{6}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{4} \\ \frac{1}{6} \\ + \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{7}{8} \\ \frac{1}{2} \\ + 6\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{3} \\ \frac{1}{4} \\ + \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 2\frac{1}{3} \\ 1\frac{1}{4} \\ + 2\frac{1}{2} \\ \hline \end{array}$$

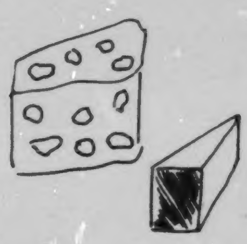
$$\begin{array}{r} \frac{1}{5} \\ \frac{1}{6} \\ + \frac{1}{7} \\ \hline \end{array}$$

P.O. 5.06.05.04

NAME: ______________________ CLASS: __________ DATE: ________

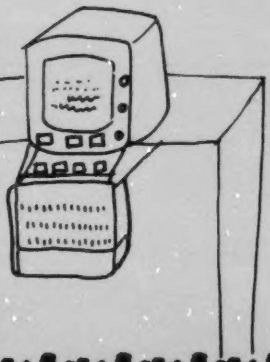
Solve the problems.

1. Susan bought $2\frac{2}{3}$ yards of red fabric and $\frac{7}{8}$ of a yard of white fabric. How much fabric did she buy?



2. Sara was planning a party. She bought $2\frac{3}{6}$ pounds of Swiss cheese and $3\frac{1}{3}$ pounds of American cheese. How many pounds of cheese did she buy in all?

3. Sean jogs every day. He ran $3\frac{1}{2}$ miles on Monday, $2\frac{2}{3}$ miles on Tuesday and $\frac{7}{8}$ of a mile on Wednesday. How many miles did he jog in three days?



4. Tom loves the computer. He tries to get as much computer time as possible. One week he spent $4\frac{1}{2}$ hours at the computer. He spent $6\frac{1}{2}$ hours using the computer each week for the next two weeks. How much computer time did he get in all?

5.06.06 SUBTRACTION OF FRACTIONS WITH UNLIKE DENOMINATORS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.06.01A subtract two fractions with like numerators and unlike denominators and rename in simplest form;

e.g.,

$$\begin{array}{rcccl} \frac{1}{3} & = & \frac{1}{3} \times \frac{4}{4} & = & \frac{4}{12} \\ -\frac{1}{4} & = & \frac{1}{4} \times \frac{3}{3} & = & \frac{3}{12} \\ \hline & & & & \frac{1}{12} \end{array}$$

5.06.06.02A subtract mixed numbers and rename in simplest form;

e.g.,

$$\begin{array}{rcccr} 3\frac{4}{5} & = & 3\frac{4}{5} \times \frac{3}{3} & = & 3\frac{12}{15} \\ -\ 1\frac{2}{3} & = & 1\frac{2}{3} \times \frac{5}{5} & = & -\ 1\frac{10}{15} \\ \hline & & & & 2\frac{2}{15} \end{array}$$

5.06.06.03A solve word problems related to skills learned in this module.

e.g.,

Sara bought $3\frac{1}{2}$ lbs. of granola. She gave Lorraine $1\frac{1}{8}$ lbs. How much did she have left?

$$\begin{array}{rcl} 3\frac{1}{2} & = & 3\frac{4}{8} \\ -\ 1\frac{1}{8} & = & -1\frac{1}{8} \\ \hline & & 2\frac{3}{8} \text{ lbs. left.} \end{array}$$

5.06.06

VOCABULARY

TERMS	**SYMBOLS**
unlike denominators	
equivalent fractions	
least common denominator	LCD
simplify	

GETTING STARTED

Prepare 12 cards with the following least common denominators.

$$\boxed{10}\quad\boxed{8}\quad\boxed{6}\quad\boxed{12}\quad\boxed{24}\quad\boxed{6}\quad\boxed{12}\quad\boxed{12}\quad\boxed{15}\quad\boxed{30}\quad\boxed{40}\quad\boxed{30}$$

Write the following examples on the chalkboard.

e.g.,

$$\begin{array}{r} \frac{1}{6} \\ -\frac{3}{24} \\ \hline \end{array}\qquad \begin{array}{r} \frac{5}{6} \\ -\frac{1}{2} \\ \hline \end{array}\qquad \begin{array}{r} \frac{5}{12} \\ -\frac{1}{6} \\ \hline \end{array}\qquad \begin{array}{r} \frac{3}{4} \\ \frac{1}{6} \\ \hline \end{array}\qquad \begin{array}{r} \frac{2}{5} \\ \frac{1}{3} \\ \hline \end{array}\qquad \begin{array}{r} \frac{3}{8} \\ \frac{3}{10} \\ \hline \end{array}\qquad \begin{array}{r} \frac{3}{10} \\ \frac{2}{15} \\ \hline \end{array}\qquad \begin{array}{r} \frac{9}{10} \\ -\frac{1}{6} \\ \hline \end{array}$$

Ask the students to choose the LCD card which matches each example and place it under the example.

e.g.,

$$\begin{array}{r} \frac{1}{6} \\ -\frac{3}{24} \\ \hline \boxed{24} \end{array}$$

Repeat this procedure.

Prepare two blank cubes. Number one cube, 0 through 5, and the second cube, 5 through 10. Ask the students to fold a paper into four columns and label the first column Fraction, the second column Simplify, the third column Improper Fraction and the fourth column Rename. Ask a student to roll the two cubes. Say, "What are the two numbers on the cubes? Use the two numbers just rolled to express proper and improper fractions. Using these fractions complete the chart."

e.g.,

Fraction	Simplify	Improper Fraction	Rename
$\frac{4}{6}$	$\frac{2}{3}$	$\frac{6}{4}$	$1\frac{2}{4} = 1\frac{1}{2}$

Repeat this procedure.

5.06.06

5.06.06.01 **subtract two fractions with like numerators and unlike denominators and rename in simplest form**

STRATEGY 1: Write $\frac{1}{2} - \frac{1}{6} = \square$ on the chalkboard. Say, "When two fractions have unlike denominators, we must find the common denominator before we can subtract. What is the common denominator of $\frac{1}{2}$ and $\frac{1}{6}$? (6) How will we change $\frac{1}{2}$ to a fraction with a denominator of 6?" (multiply the numerator and the denominator by 3)

e.g., $\frac{1}{2} \times \frac{3}{3} = \frac{3}{6} \qquad \frac{3}{6} - \frac{1}{6} = \square$

Say, "Now we can complete the example.

e.g., $\frac{3}{6} - \frac{1}{6} = \frac{2}{6}$

Can we simplify $\frac{2}{6}$? (Yes) What number can be divided into 2 and 6?" (2) $\frac{2}{6} = \frac{1}{3}$

STRATEGY 2: Write $\frac{1}{3} - \frac{1}{8} = \square$ on the chalkboard. Say, "Are the denominators alike? (No) Find the LCD by using multiples." Ask the students to list the first ten multiples of 3 and 8, and circle the LCD.

e.g.,

3:	3	6	9	12	15	18	21	24	27	30
8:	8	16	24	32	40	48	56	64	72	80

Say, "The LCD for 3 and 8 is 24. How can we change the denominators to 24?" (Multiply $\frac{1}{3}$ by $\frac{8}{8}$ and $\frac{1}{8}$ by $\frac{3}{3}$.)

e.g.,

$$\begin{array}{rl} \frac{1}{3} \times \frac{8}{8} & = \frac{8}{24} \\ \underline{-\ \frac{1}{8} \times \frac{3}{3}} & = \frac{3}{24} \end{array}$$

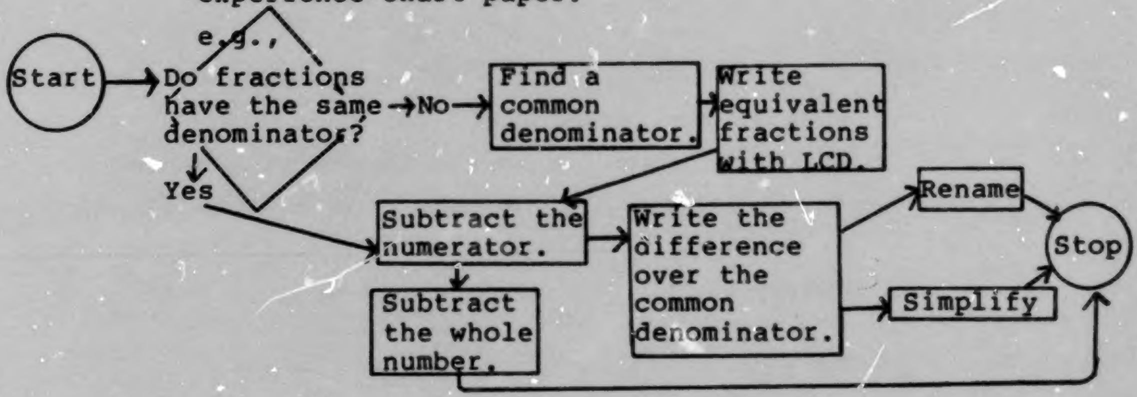
Ask a student to complete the subtraction. Say, "What is the answer? $(\frac{5}{24})$ Is it in simplest terms?" (Yes)

5.06.06

5.06.06.02 subtract mixed numbers and rename in simplest form

STRATEGY 1: Prepare and display a flow chart drawn on experience chart paper.

e.g.,


Start
Do fractions have the same denominator?
No
Yes
Find a common denominator.
Write equivalent fractions with LCD.
Subtract the numerator.
Subtract the whole number.
Write the difference over the common denominator.
Rename
Simplify
Stop

Write $6\frac{7}{8} - 2\frac{3}{5}$ on the chalkboard. Say, "Let's follow the steps in the flow chart. The denominators are different. We must find a common denominator. List the multiples of 8 and 5. 40 is the common multiple. Multiply $\frac{7}{8} \times \frac{5}{5}$ and $\frac{3}{5}$ by $\frac{8}{8}$." Demonstrate on the chalkboard.

e.g.,

$$\begin{array}{rcccl} 6\frac{7}{8} & = & \frac{7}{8} \times \frac{5}{5} & = & 6\frac{35}{40} \\ - \ 2\frac{3}{5} & = & \frac{3}{5} \times \frac{8}{8} & = & 2\frac{24}{40} \\ \hline \end{array}$$

Say, "Subtract the fractions. Subtract the whole numbers." $(4\frac{11}{40})$

STRATEGY 2: Write an example on the chalkboard. Have one missing component in each part of the example.

e.g.,

$$\begin{array}{rcl} 6\frac{3}{5} & = & 6\frac{9}{\square} \\ - \ 2\frac{1}{3} & = & 2\frac{5}{\square} \\ \hline \end{array}$$

Say, "What is missing in this example? (LCD) To find the LCD, we must find the least common multiples of 5 and 3. What is the LCM?" (5,3) = 15.

Write 15 in the denominators' boxes. Say, "How did

STRATEGY 2: cont'd we get a 9 and a 5 in the numerator? Multiply $\frac{1}{3}$ x $\frac{5}{5}$ and $\frac{3}{5}$ x $\frac{3}{3}$. Subtract the fractions and then the whole number." Repeat this procedure for other examples.

5.06.06.03 **solve word probles related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard.

> Terry likes to swim twice a day. Terry does not like to swim when it is too hot. In order to avoid the heat, she would swim $1\frac{1}{2}$ miles in the morning and $1\frac{3}{4}$ miles in the late afternoon. How much farther did Terry swim in the afternoon than in the morning?

Say, "We are going to look for key words: words to help solve the problem and important number facts. Read the problem and find the key words. (how much farther) What operation would you use to solve this problem?" (subtraction) Write $1\frac{3}{4} - 1\frac{1}{2}$ on the chalkboard. Ask the students to solve.

STRATEGY 2: Write the following problem on the chalkboard.

> In the morning Jane's shadow was $2\frac{1}{4}$ sections long. In the afternoon Jane's shadow was $3\frac{1}{3}$ sections long. How much longer was her shadow in the afternoon than the morning?

Ask the students to choose the correct operation, solve and label the answer.

e.g.,

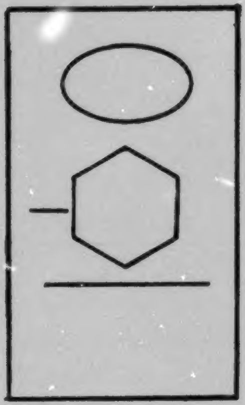
$$\begin{array}{rcl} 3\frac{1}{3} & = & 3\frac{4}{12} \\ -\ 2\frac{1}{4} & = & 2\frac{3}{12} \\ \hline & & 1\frac{1}{12} \text{ sections longer} \end{array}$$

P.O. 5.06.06.01

NAME: ______________________ CLASS: __________ DATE: ________

Find the least common denominator. Subtract the fractions. Rename in simplest form.

fraction	find LCD and subtract	ANSWER
$\frac{1}{2} - \frac{1}{6}$	$\frac{3}{6} - \frac{1}{6} = \frac{4}{6}$	⬭ $\frac{4}{6}$
$\frac{2}{3} - \frac{2}{6}$		⬡
$\frac{4}{6} - \frac{4}{\ }$		○
$\frac{3}{9} - \frac{3}{12}$		□
$\frac{3}{10} - \frac{3}{15}$		△
$\frac{1}{3} - \frac{1}{9}$		◇

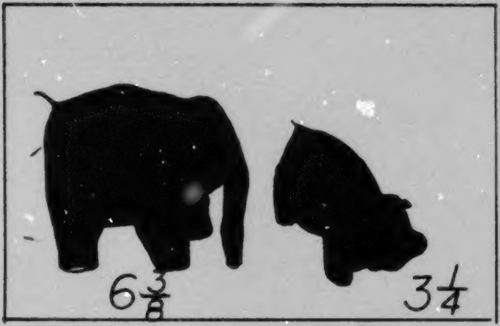


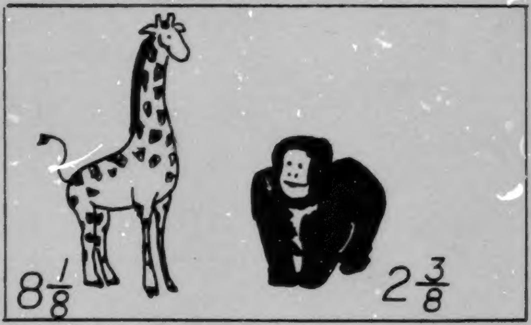
Would you rather have ¼ of a cake or 2/8 of a cake?
Neither. I'd rather have pie!

P.O. 5.06.05.02

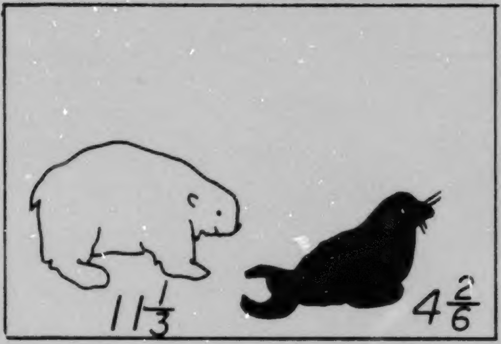
NAME: ______________________ CLASS: ________ DATE: ________

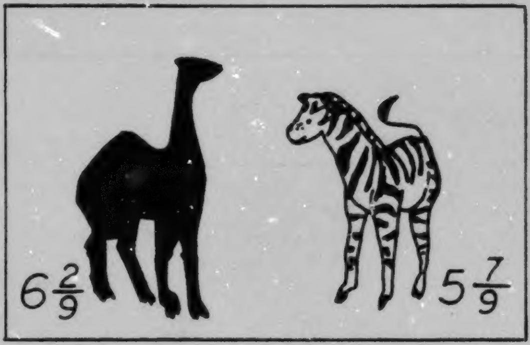
Find the difference.

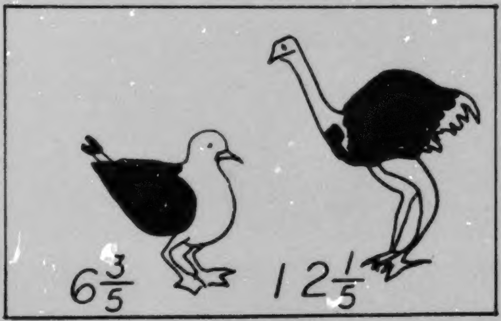

$6\frac{3}{8}$
$3\frac{1}{4}$

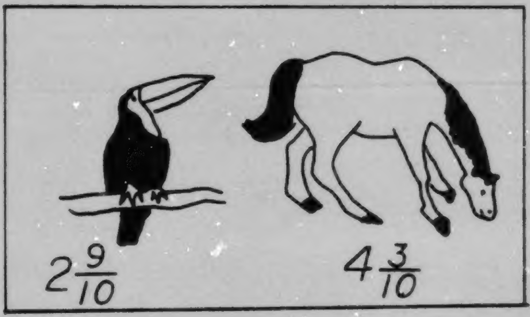

$8\frac{1}{8}$
$2\frac{3}{8}$

At the Zoo


$11\frac{1}{3}$
$4\frac{2}{6}$


$6\frac{2}{9}$
$5\frac{7}{9}$

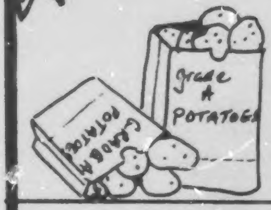
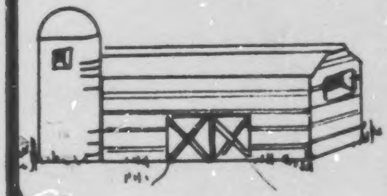

$6\frac{3}{5}$
$12\frac{1}{5}$


$2\frac{9}{10}$
$4\frac{3}{10}$

P.O. 5.06.06.03

NAME: ______________________ CLASS: ________ DATE: ________

Solve and check each problem.

	Solve	Check
 Grade A POTATOES GRADE A POTATOES The small bag of potatoes weighs $2\frac{3}{4}$ lbs. The large bag of potatoes weighs $5\frac{2}{3}$ lbs. How much more does the larger bag weigh? ______		
Plant A is $6\frac{7}{8}$ inches tall. Plant B is $4\frac{3}{5}$ inches tall. How much taller is Plant A than Plant B?		
Bag A contains $7\frac{1}{4}$ lbs. of apples. Bag B contains $3\frac{6}{7}$ lbs. of apples. How much more does bag A weigh? ______		
John ran $8\frac{1}{2}$ miles on Monday. He ran $6\frac{2}{5}$ miles on Tuesday. How much farther did John run on Monday? ______		
 Mike's farm lies on $2\frac{5}{6}$ acres of land. Tom's farm lies on $4\frac{1}{3}$ acres of land. How much more land does Tom have? ______		

Unit 49

5.10.05 SCALE DRAWINGS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.05.01B identify the need for scale drawings; e.g., maps, diagrams

5.10.05.02B make a scale drawing of a room developing key.
e.g.,

key: 1 cm = 3 m
1 centimeter in drawing corresponds to 3 meters in a room.

Room: 8 m long
7 m wide

Drawing: 24 cm long
32 cm wide

5.10.05

VOCABULARY

TERMS

key
scale
diagram

GETTING STARTED

Prepare and distribute centimeter rulers. Ask the students to draw various line segments and exchange papers with a neighbor. Say, "Measure each line segment to the nearest centimeter."

Prepare a map of the United States, a 12 inch ruler and a yard stick. Point to New York City area. Say, "This is the New York City area of the United States. This is where we live."

Ask the students to use the rulers to measure distances between cities.

e.g.,

miles
New York City <———☐———> Chicago

5.10.05

5.10.05.01 **identify the need for scale drawings**

STRATEGY 1: Prepare and display a scale drawing of the classroom. Say, "This is a drawing of our classroom. It is not the same exact size but has the same shape. I drew this picture to scale. Scale means using a smaller measurement to represent a larger one. The scale I used was one cm equals one m. The chalkboard is really four meters long and in the drawing it is four cm long. We must note the scale used to show the measurement that represents the actual length. Scales are needed to draw maps or plans for rooms or houses.

STRATEGY 2: Prepare and display a scale drawing of the classroom. Say, "I had to draw a smaller version of the classroom. What I did was choose a certain distance to represent the actual length of the classroom."

Ask a student to measure the width of the front of the room (from window to door) with a meter stick. Ask another student to measure the same area on the drawing with a centimeter ruler.

Say, "How many meters was the actual width? (approximately 9 meters) How many centimeters was the representation? (9 cm) What scale did I use? (1 cm = 1 meter) A scale is used to show the measurement used to represent an actual distance in a drawing when it would not be convenient to draw something to its true size."

5.10.05

5.10.05.02 **make a scale drawing of a room developing a key**

STRATEGY 1: Prepare and distribute a meter stick, centimeter rulers and drawing paper. Say, "We are going to draw a representation of the classroom. The scale we will use is 1 cm = 1 meter. This is called the key. We include it so that people using our drawing will be able to figure out the true measurements."

Ask a student to measure the classroom with the meter stick. Give the measurements for one side of the classroom at a time. Illustrate at the chalkboard while the students work independently. When the basic floor plan is completed, add various other parts of the room to scale, e.g., closets, teacher's desk, bookshelf.

STRATEGY 2: Say, "We are going to make a scale drawing on the chalkboard." Choose an object to be drawn to scale, e.g., teacher's desk. Say, "First we must decide on a scale." Write the scale on the chalkboard.

e.g.,

1 cm = 1 m

Say, "This is called a key. We include it so that people using this drawing will be able to figure out the actual measurement."

Measure the desk and draw it to scale on the chalkboard. Ask the students to pick objects in the classroom they would like to draw to scale. Distribute rulers, meter sticks and paper. Say, "First you must develop your key and then draw the item to scale. Include the scale you use when you draw the object on your paper."

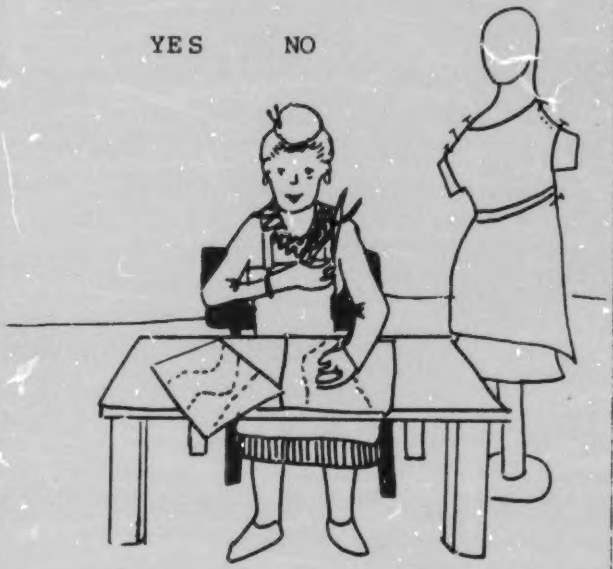
P.O. 5.10.05.01

NAME: ______________________ CLASS: __________ DATE: ________

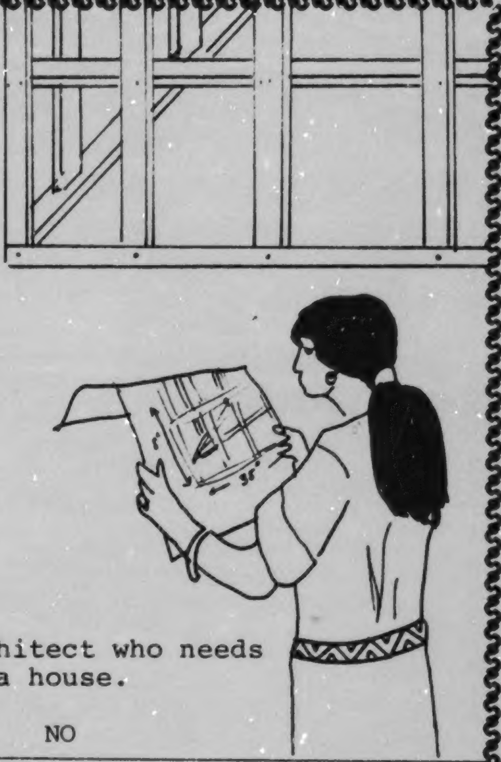
Look at the picture and decide whether the situations will need a scale drawing . Circle yes or no.

1. The dressmaker who needs a a pattern of a dress.

YES NO



2.

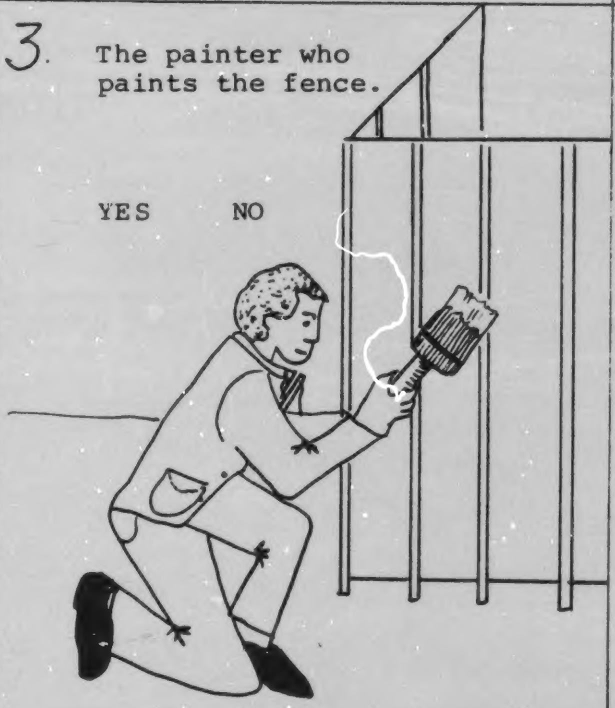


The architect who needs builds a house.

YES NO

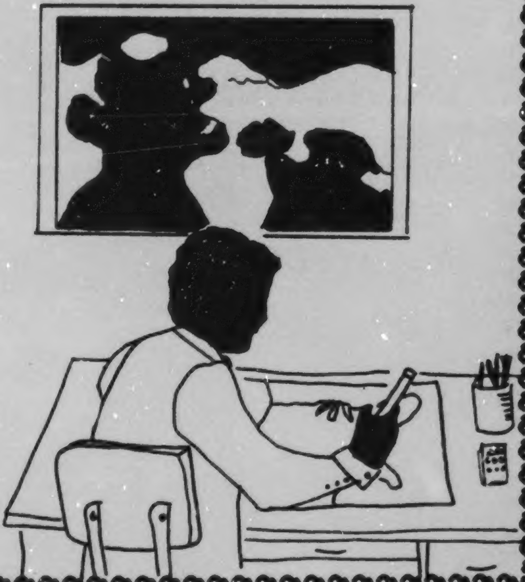
3. The painter who paints the fence.

YES NO



4. The man who makes the map of the United States.

YES NO



P.O. 5.10.05.02

NAME: ______________________________ CLASS: __________ DATE: ______

Draw a scale drawing of something at home or at school. Make sure you indicate your scale on your worksheet. Some suggestions are your bedroom, living room or your classroom.

5.01.05 EXPONENTS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.05.01B identify and define the exponent as the number written above the base to show how many times the base is used as a factor;

e.g.,

$$\underset{\text{base}}{10}^{\overset{\text{exponent}}{3}} \longrightarrow 10 \times 10 \times 10 = 1{,}000$$

5.01.05.02B rename a standard number in expanded notation using exponents.

e.g.,

$$\begin{aligned} 74{,}371 &= (7 \times 10{,}000) + (4 \times 1{,}000) + (3 \times 100) \\ &\quad + (7 \times 10) + (1 \times 1) \\ &= (7 \times 10^4) + (4 \times 10^3) + (3 \times 10^2) \\ &\quad + (7 \times 10^1) + (1 \times 10^0) \end{aligned}$$

5.01.05

VOCABULARY

TERMS	SYMBOLS
base	n
exponent	n^3
powers of ten	

GETTING STARTED

Draw the following place value chart on the chalkboard. Name the places by showing how many times 10 is used as a factor.

e.g.,

10,000	1,000	100	10	1
(10x10x10x10)	(10x10x10)	(10x10)	(10x1)	1

Ask the students to write standard numbers in the place value chart.

Prepare two sets of cards. One set with standard numbers and one set with other numbers written in expanded form. Mix the two sets of cards together. Divide the class into two teams. Ask a student from Team A to select a card, e.g., $\boxed{1234}$. Say, "If your card has a standard number, rewrite it as an expanded number. If your card has an expanded number, rewrite it as a standard number. The first team to get 11 points wins the game.

5.01.05

5.01.05.01 **identify and define the exponent as the number written above the base to show how many times the base is used as a factor**

STRATEGY 1: Say, "How much is 10 times 10? (100) How much is 10 times 10 times 10?" (1,000) Repeat this procedure until there are too many tens for the students to remember. Say, "How much is 10 times itself 4 times? Write 10 x 10 x 10 x 10 on the chalkboard. Say, "The shortcut for writing a number times itself is to use an exponent with the base number. First we write a 10. 10 is the base number. Write a small number near the top of the ten which tells how many times 10 was used as a factor. The small number is called the exponent." Demonstrate on the chalkboard.

e.g.,

$$10^{2\swarrow\text{exponent}} = 10 \times 10 = 100$$

Say, "We read 10^2 as 'ten to the second power'; 10^3 is read as 'ten to the third power'. The exponent tells us how many times 10 is multiplied by itself and the number of zeros in the answer, e.g., $10^4 =$ 10,000." Write 10^0 on the chalkboard. Say, "Any non-zero number to the zero power equals 1, e.g., $10^0 = 1$.

STRATEGY 2: Draw a place value chart on the chalkboard.

e.g.,

Ten thousands	Thousands	Hundreds	Tens	Ones

Say, "As we move to the left on the place value chart, each place is ten times greater than the place to its right." Fill in the numerical values in the chart.

e.g.,

Ten thousands	Thousands	Hundreds	Tens	Ones
10x10x10x10	10x10x10	10 x 10	10	1

5.01.05

STRATEGY 2: cont'd

Say, "A short way to write each expression is to use an exponent. The exponent tells us how many times ten was multiplied by itself." Write $10 \times 10 \times 10 \times 10 = 10^4$ on the chalkboard. Say, "10 is the base and 4 is the exponent." Ask the students to copy the place value chart and write each number using exponents.

5.01.05.02 **rename a standard number in expanded notation using exponents**

STRATEGY 1:

Draw a place value chart on the chalkboard. Write 458 in the place value chart.

e.g.,

Ten Thousands	One Thousands	Hundreds	Tens	Ones
		4	5	8

Say, "The digit 4 means 4 x 100, the digit 5 means 5 x 10, and the 8 means 8 x 1. Can anyone think of a shorter way to write the numbers that name place value? (powers of ten expressed using exponents) The number of zeros tells the exponent."

Ask a student to write 458 in expanded form and then using exponents.

e.g.,

458

400 + 50 + 8

$(4 \times 10^2) + (5 \times 10^1) + (8 \times 10^0)$

Repeat this procedure using 5 place numbers.

STRATEGY 2:

Prepare and distribute squared material. Say, "Use the squared material to show the value of 457. There are 4 hundreds, 5 tens and 7 ones." Write 400 + 50 + 7 = (4x100) + (5x10) + (7x1) on the chalkboard.

STRATEGY 2: cont'd

Say, "Who can remember how to write the value of each place using exponents?" e.g., 100 = 10^2. Ask the students to write the value of each place, from ones through ten thousands, using exponents.

e.g.,

$$10^4 = 10 \times 10 \times 10 \times 10 = 10{,}000.$$

Ask students to write the expanded form of 457 using exponents.

e.g.,

$$457 = (4 \times 10^2) + (5 \times 10^1) + (7 \times 10^0)$$

Repeat this procedure using 4- and 5-digit numbers.

P.O. 5.01.05.01

NAME: ____________________ CLASS: __________ DATE: ________

I. What does the exponent mean in each number?

II. Rewrite each expression using components.

I

10^2 = 10 X 10 = 100

10^4 = ____________________ =

10^6 = ____________________ =

10^1 = ____________________ =

10^3 = ____________________ =

10^5 ____________________ =

II

10 X 10 X 10 = 10^3

10 X 10 = ____________________

10 X 10 X 10 X 10 X 10 X 10 = ____________________

10 X 10 X 10 10 X 10 = ____________________

10 X 10 X 10 X 10 ____________________

P.O. 5.01.05.02

NAME: ______________________ CLASS: ________ DATE: ________

Use powers of ten to complete each example.

9= $9x10^{0}$ so 7= 7x ________ and 3= 3x ____________

20= $2x10^{1}$ so 60= 6x ________ and 80= 8x ____________

300= $3x10^{2}$ so 500= 5x ________ and 700= 7x ____________

4,000= $4x10^{3}$ so 8,000= 8x ________ and 2,000= 2x ____________

20,000= $2x10^{4}$ so 60,000= 6x ________ and 90,000= 9x ____________

23,458=(2x_____)+(3x_____)+(4x_____)+(5x______)+(8x________)

45,397=(4x_____)+(5x_____)+3x______)+(9x______)+(7x________)

73,133=(7x_____)+(3x_____)+(1x_____)+(3x______)+(3x________)

26,417= ( )+( )+( )+( )+( )

39,846= ( )+( )+( )+( )+( )

27,463= ( )+( )+( )+( )+( )

5.11.01 ORDER OF OPERATIONS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.11.01.01A identify and utilize the correct order of operations;

e.g.,

$$4^2 + 2 \div 2 - 3 \times 5$$
$$16 + 1 - 15 =$$
$$17 - 15 = 2$$

5.11.01.02A recognize that in the order of operations, any calculations indicated within parenthesis must be computed first.

e.g.,

$$(6^2 + 2) \div 2 - (3 + 5) =$$
$$(36 + 2) \div 2 - 8 =$$
$$38 \div 2 - 8 =$$
$$19 - 8 = 11$$

5.11.01

VOCABULARY

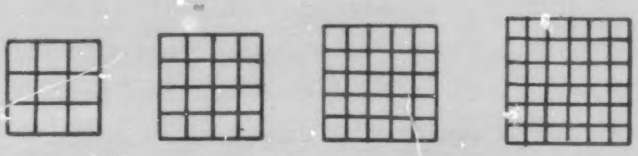
TERMS

squared
exponents

GETTING STARTED

Prepare and distribute graph paper. Tape a large piece of graph paper to the chalkboard. Ask the students to draw the following squares on their graph paper.

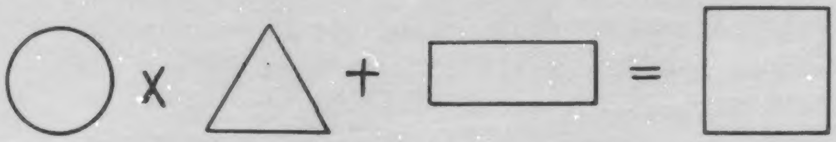
e.g.,



Ask the students to write the multiples that will produce that square. Say, "Since the first square is 3 x 3 we can also express it using exponents as 3^2." Repeat this procedure for the remaining squares.

Prepare two sets of cards numbered 1 through 9. Divide the class into two teams. Write the following on the chalkboard.

e.g.,



Ask a student to pick three cards. The team must try to place each card in the frames to get the greatest answer.

e.g.,

Team A	Team B
$\boxed{7} \times \boxed{6} + \boxed{3} = 45$	$\boxed{7} \times \boxed{3} + \boxed{6} = 27$

The team with the greatest product wins the point.

Repeat this procedure until all of the cards have been used.

5.11.01

5.11.01.01 identify and utilize the correct order of operations

STRATEGY 1: Write the following example on the chalkboard.

$$4^2 + 4 \div 2 - 1 = \square$$

Ask the students to solve the example. (The responses will differ.) Say, "Why didn't we all get the same answer? (We did not know what to do first.) There is an order to solving these problems. It is called the order of operations. First, solve the exponents; second, either use multiplication or division, and third, compute the addition or subtraction." Return to the problem on the chalkboard and apply the rules.

e.g., $4^2 + 4 \div 2 - 1 =$
$16 + 4 \div 2 - 1 =$
$16 + 2 - 1 =$
$18 - 1 = 17$

STRATEGY 2: Write the following rules on the chalkboard.

e.g.,
1) Exponents
2) Multiplication and Division
3) Addition and Subtraction

Say, "When doing examples with more than one operation, we must follow the order outlined on the chalkboard." Write this problem on the chalkboard.

$$4^2 + 4 \div 2 - 1 = \square$$

Ask the students to look at the rules on the chalkboard and suggest what should be done first. (the exponents)

e.g., $16 + 4 \div 2 - 1 = \square$

Look at our rules, what should be done next? (the division)

e.g., $16 + 2 - 1 = \square$

Look at our rules, what should be done next? (the addition, then subtraction)

STRATEGY 2: cont'd

e.g.,

18 - 1 = 17

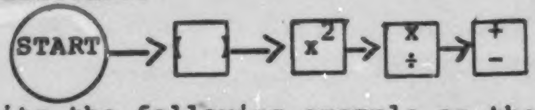
5.11.01.02 **recognize that in the order of operations any calculations indicated within the parenthesis must be computed first**

STRATEGY 1: Prepare a set of cards with the following signs: ( ), 2^2, x, ÷, +, -. Review the order of operations. Draw parenthesis on the chalkboard. Say, "In the order of operations, the calculations within the parenthesis are always computed first."

Divide the class into two teams. Ask each team to pick one card. Whichever card has priority in the order of operations will merit a point for that team.

e.g., If the cards picked are ( ) and x, the team with the parenthesis will win the point. The game continues for several rounds in this manner.

STRATEGY 2: Review the rules for the order of operation. Say, "The calculation in a parenthesis is always done first." Draw a simplified flow chart on the chalkboard.



Write the following example on the chalkboard.

$3^2 \times (1 + 3) - 5 = \square$

Say, "Use the flow chart to help solve the example."

e.g.,

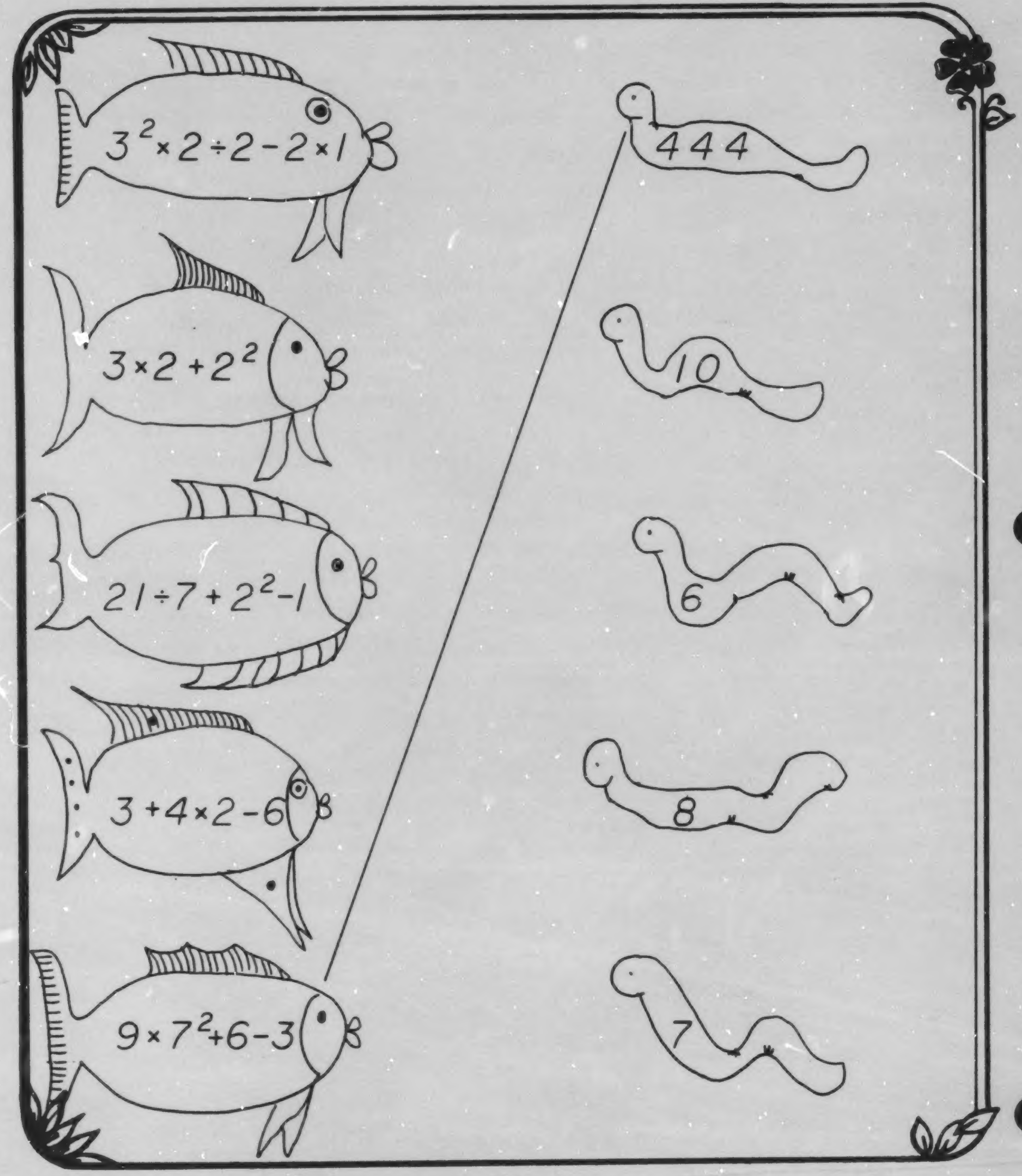
$3^2 \times 4 - 5 =$
$9 \times 4 - 5 =$
$36 - 5 = 31$

Repeat this procedure using other numbers.

P.O. 5.11.01.01

NAME: ______________________ CLASS: __________ DATE: ________

Solve and match.


$3^2 \times 2 \div 2 - 2 \times 1$
$3 \times 2 + 2^2$
$21 \div 7 + 2^2 - 1$
$3 + 4 \times 2 - 6$
$9 \times 7^2 + 6 - 3$
444
10
6
8
7

P.O. 5.11.01.02

NAME: ____________________ CLASS: __________ DATE: __________

Solve. Use order of operations.

SOLVE these problems.

REMEMBER The parenthesis is done first.

① $3 \times 2 + (5-1) =$

$3 \times 2 + 4 =$

$6 + 4 =$

10

② $3 \times (2+5) - 1$

③ $(3 \times 2) + 5 - 1$

④ $100 \div (10 \times 5) \times (5 \times 9) =$

⑤ $(8+4) \times (7-3) - 4 =$

⑥ $7 - (3+1) \times 8 \div 4 =$

⑦ $36 \div 6 \times 2 - (4+4) =$

⑧ $45 \div 9 \times 3 - (6+3) =$

⑨ $(7 \times 7) - 7 \times 7 =$

⑩ $(10 \times 10) + (8 \times 8) \div 4 =$

5.10.06 MASS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.06.01B identify relationships among ounces (oz.), pounds (lbs.) and tons (t); e.g.,

16 oz. = 1 lb.
2000 lbs. = 1 ton
$\frac{1}{2}$ lb. = 8 oz.
$\frac{1}{4}$ ton = 500 lbs.

5.10.06.02A identify the relationships among gram (g), milligram (mg) and kilogram (kg) and the metric ton;

e.g.,
1000 milligrams = 1 gram
1000 grams = 1 kilogram
1000 kilograms = 1 metric ton

5.10.06.03A solve word problems related to skills learned in this module.
e.g.,

Ten students weighed themselves. Their combined weight is 1000 lbs. Is their combined weight more or less than a ton?

5.10.06

VOCABULARY

TERMS	SYMBOLS
ounces	oz.
pounds	lbs.
tons	t
gram	g
milligram	mg
kilogram	kg

GETTING STARTED

Say, "What items are measured by weight?" (produce, people, meats, grains) Ask the students to identify those units of measure used to measure weight, e.g., ounces, pounds, tons, milligrams, grams and kilograms. Write the words on the chalkboard and ask the students for the abbreviations for each unit.

Display a set of pictures of various objects. Ask the students to identify those objects that can be weighed. Say, "What unit of weight would you use to weigh a particular object?" e.g., a pencil would be weighed in ounces or grams. As the students name different units of measure write the units and the abbreviation for each unit on the chalkboard.

e.g.,

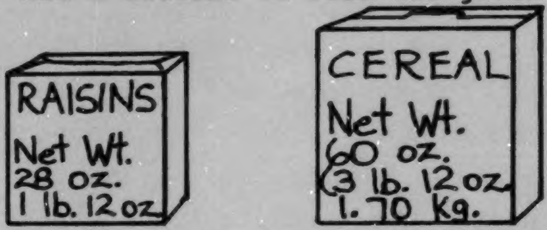
ounces - oz.
pounds - lbs.
tons - t
milligram - mg
gram - g
kilograms - kg

5.10.06

5.10.06.01 **identify relationships among ounces (oz.), pounds (lbs.) and tons (t)**

STRATEGY 1: Say, "Ounces, pounds and tons are standard units of measure for weight (mass) used in the United States." Display various grocery items which weigh more than one pound. Ask the students to locate the place where the weight is given on each package. Ask a student to read the given weight aloud.

e.g.,


RAISINS
Net Wt.
28 oz.
1 lb. 12 oz.
CEREAL
Net Wt.
60 oz.
3 lb. 12 oz.
1.70 Kg.

Say, "The weight is given in three different ways. The first weight is given in ounces. The second weight is given in pounds and ounces." Write the following on the chalkboard, e.g., 28 oz. = 1 lb. 12 oz. Say, "These are equal weights since they measure the same amount. An ounce is part of a pound. From the information given, can you calculate how many ounces are equal to one pound?" (Subtract 12 from 28, the difference would be the number of ounces equal to one pound or 16 oz.) Write 16 oz. = 1 lb. on the chalkboard.

Say, "What is $\frac{1}{2}$ of 16 oz.?" (8 oz.) Repeat for $\frac{1}{4}$ of a pound.

Display a picture of an item which would be measured in tons, e.g., an automobile. Say, "A certain car weighs 2,300 lbs. or 1 ton and 300 lbs." Repeat the same procedure above to discover that 2,000 lbs. = 1 ton, 1000 lbs. = $\frac{1}{2}$ ton, 500 lbs. = $\frac{1}{4}$ ton.

STRATEGY 2: Prepare and display a kitchen scale showing ounces and ounce weights for demonstration purposes.

STRATEGY 2: cont'd	Place a weight on the scale. Ask a student to read the weight. Ask another student to add ounce weights, one at a time, until the weight of one pound is reached. Say, "How many ounce weights did we need to equal one pound? (16) How many ounces are equal to one pound? (16) How many ounces are equal to $\frac{1}{2}$ of a pound? (8) ...$\frac{1}{4}$ pound? (4) A ton is a standard unit of measure used to weigh very heavy items. 2,000 lbs. = 1 ton. What is $\frac{1}{2}$ of 2,000? (1,000) To how many pounds is $\frac{1}{2}$ ton equal?" (1,000 lbs.) Repeat this process for $\frac{1}{4}$ ton.

5.10.06.02 **identify the relationships among grams (g.), milligram (mg) and kilogram (kg) and the metric ton**

STRATEGY 1: Write the words milligram, gram and kilogram on the chalkboard. Say, "Which words have prefixes? (milligram, kilogram) The prefix milli, in the metric system, means one thousandth. The prefix kilo means one thousand." Write the following on the chalkboard: milligram = .001 gram, kilogram = 1000 grams.

Say, "If a milligram is .001 of a gram, how many milligrams will equal one gram?" (1,000) Write 1,000 milligrams = 1 gram on the chalkboard. Say, "1,000 kilograms equals 1 metric ton."

STRATEGY 2: Prepare and display a metric scale, objects that weigh about a gram (paper clip) and an object that weighs about a kilogram (a book). Ask a student to weigh the objects. Pass the objects around so that the students can feel the difference in weight. Say, "A milligram = .001 of a gram and a kilogram = 1,000 grams." Write this on the chalkboard. Say, "How many milligrams equal a gram?" (1,000) Write this on the chalkboard. Say, "Very heavy objects

STRATEGY 2: cont'd

are measured in metric tons. 1,000 kilograms are equal to one metric ton." Write this on the chalkboard. Ask the students to name items they would measure in milligrams, grams, kilograms and metric tons.

5.10.06.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard.

> 10 students weighed themselves. Their combined weight is 1,000 lbs. Is their combined weight more or less than a ton?

Ask the students to solve the problem. Repeat this procedure using other problems.

STRATEGY 2: Write the following information on the chalkboard.

e.g.,

16 oz = 1 lb.
2,000 lbs. = 1 ton
$\frac{1}{2}$ lb. = 8 oz.
$\frac{1}{4}$ lb. = 4 oz.
$\frac{1}{2}$ ton = 1,000 lbs.
$\frac{1}{4}$ ton = 500 lbs.
1,000 milligrams = 1 gram
1,000 grams = 1 kilogram
1,000 kilograms = 1 metric ton

Write a word problem on the chalkboard.

e.g.,

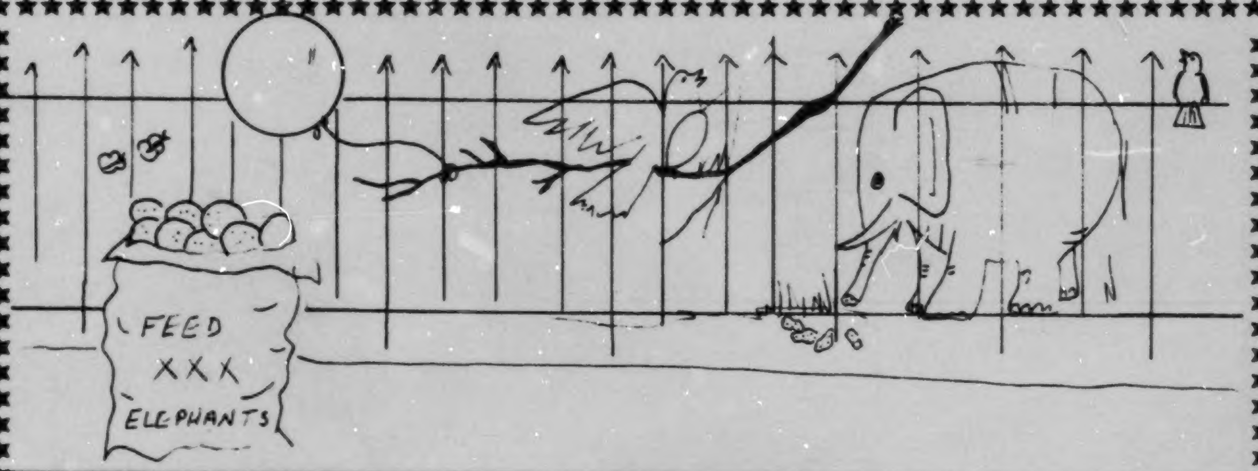
> Mary needed $\frac{1}{2}$ lb. of baking chocolate for her cake recipe. She had an 8 oz. package of baking chocolate. Did Mary have enough chocolate for her recipe? How do you know?

Ask the students to use the chart to solve the problem. Repeat this procedure with other problems.

P.O. 5.10.06.01

NAME:______________________________ CLASS:__________ DATE:________

Match the weights given in column A with their equivalent weights in column B.



A	B
½ lb.	500 lbs.
¼ ton	1000 lbs.
¼ lb.	300 lbs.
½ ton	12 oz.
1¼ lbs.	1500 lbs.
1½ tons	8 oz.
2½ lbs.	8 oz.
1¼ tons	402
3/4 lbs.	2500 lbs.
3/4 ton	2002
	4002

P.O. 5.10.06.02

NAME: ____________________ CLASS: __________ DATE: ________

Fill in the ☐ with <, > or =.

2 kilograms ☐ 2000 grams

5000 grams ☐ 3 kilograms

1 metric ton ☐ 1000 kilograms

1 gram ☐ 1000 milligrams

6,000 milligrams ☐ 4 grams

5 kilograms ☐ 5,000 grams

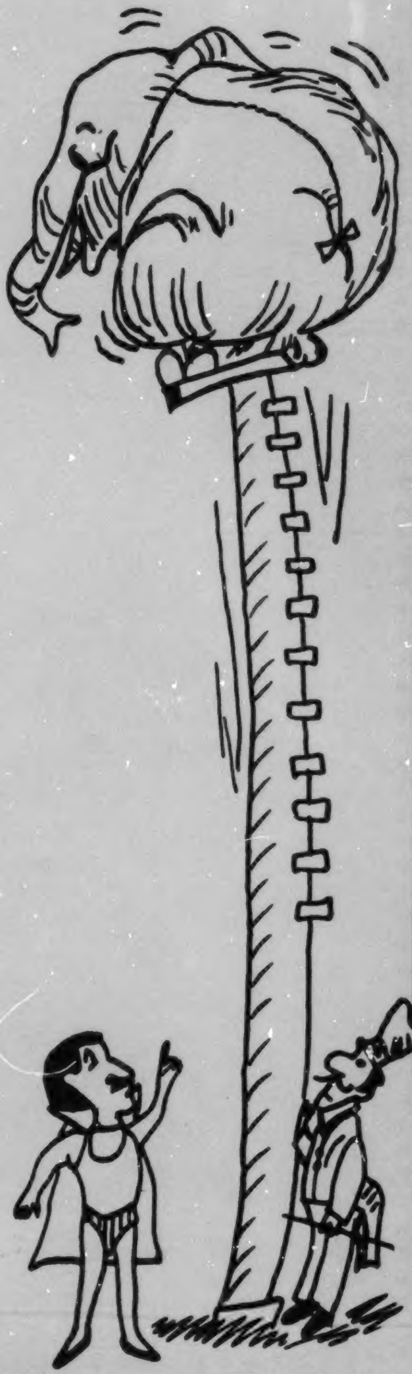
3 grams ☐ 3 kilograms

7 milligrams ☐ 7 kilograms

1,000 grams ☐ 1 kilograms

2,000 kilograms ☐ 1 metric ton

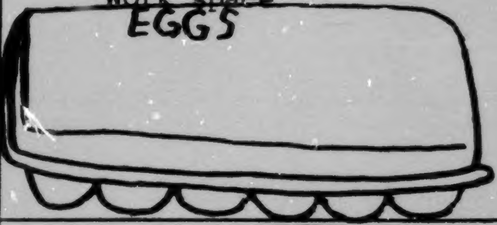
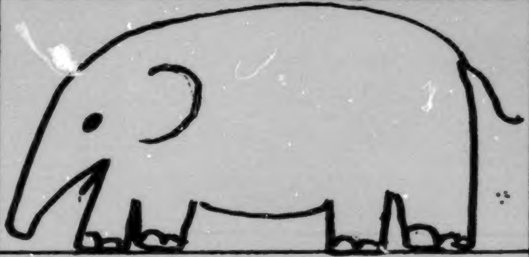
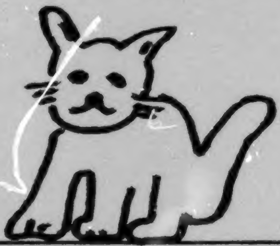
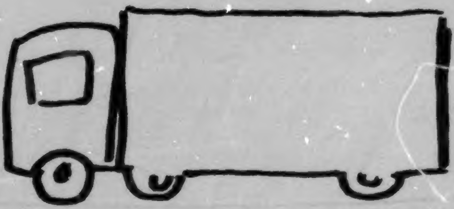
100 milligrams ☐ 1 gram



P.O. 5.10.06.03

NAME: ____________________ CLASS: __________ DATE: ________

Read each word problem and solve.

A box of eggs weighed 1 lb 2 oz. What is its total weight in ounces?	Work space 
At 2 months, a baby elephant weighed ½ ton. What was the baby elephant's weight in pounds?	
John weighed a candy bar on a metric scale. It weighed 7,000 milligrams. How any grams did the candy bar weigh?	
Alice's cat gained 1500 grams. Did Alice's cat gain more or less than a kilogram?	
Chris went to the store to buy ½ lb of butter. He bought a package that was marked 8 oz. Did Chris buy the correct amount of butter.?	
The weight of Jim's father's new truck is 6,000 kilograms. How many metric tons did the truck weigh?	

5.10.07 FRACTIONAL LINEAR MEASURMENT

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.07.01B use fractional numbers to identify relationships among inches, foot, yard, mile;

e.g.,

$\frac{1}{3}$ foot = 4 inches

$\frac{1}{3}$ yard = 1 foot

5.10.07.02B solve word problems related to skills learned in this module.

e.g.,

John jumped 60 inches in his school broad jump competition. How many feet did he jump? How many yards did he jump?

John jumped 5 feet.

John jumped $1\frac{2}{3}$ yards.

5.10.07

VOCABULARY

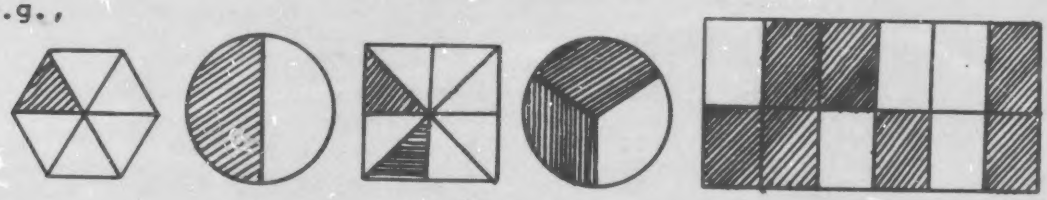
TERMS	SYMBOLS
inch	in.
foot	ft.
yard	yd.
mile	mi.

GETTING STARTED

Prepare and distribute rulers. Write the following terms on the chalkboard: inches, feet, yards, and miles. Ask the students to name items they would measure in inches, feet, yards and miles.

Ask students to measure various items in the classroom. Ask two or three students to use yardsticks to measure selected large items in the classroom.

Draw the following on the chalkboard.
e.g.,



Ask the students to identify the fraction for the shaded part of each figure.

Repeat this procedure.

5.10.07

5.10.07.01 **use fractional numbers to identify relationships among inches, foot, yard, mile**

STRATEGY 1: Prepare and distribute rulers. Say, "12 inches = 1 foot." Draw an enlarged representation of a 12 inch ruler on the chalkboard. Label each inch. Ask a student to come to the chalkboard and divide the foot in half. Say, "How many inches are in $\frac{1}{2}$ foot?" (6) Ask a student to come to the chalkboard and divide the foot into fourths. Say, "How many inches are in $\frac{1}{4}$ foot? (3) How many inches are in $\frac{3}{4}$ of a foot?" (9)

Draw a three foot line on the chalkboard. Mark each foot clearly. Say, "3 feet = 1 yard. What fractional part of a yard does one foot represent? ($\frac{1}{3}$) What fractional part of a yard does two feet represent? ($\frac{2}{3}$) How many inches are in $\frac{1}{3}$ of a yard? (12) How many inches are in $\frac{2}{3}$ of a yard?" (24) Show this representation on the line on the chalkboard.

Say, "5,280 feet = 1 mile and 1,760 yards = 1 mile. How many feet are in $\frac{1}{2}$ of a mile? (2640 feet) How many yards are in $\frac{1}{2}$ of a mile? (880) How many feet are in $\frac{1}{3}$ of a mile? (1760) How many feet are in $\frac{1}{4}$ of a mile? (1320) How many yards are in $\frac{1}{4}$ of a mile?" (440) Ask the students to identify the number of feet and yards in $\frac{2}{3}$ and $\frac{3}{4}$ of a mile using the information they computed previously.

STRATEGY 2: Write the number 12 on the chalkboard. Ask a student to identify $\frac{1}{2}$ of 12. Ask a student to identify $\frac{1}{3}$ of 12 and a student to identify $\frac{1}{4}$ of 12. Say, "12 inches = 1 foot, and how many inches are

STRATEGY 2: cont'd

equal to $\frac{1}{2}$ foot, $\frac{1}{3}$ foot and $\frac{1}{4}$ foot? How many inches are in $\frac{2}{3}$ and $\frac{3}{4}$ of a foot?" (divide by the denominator and then multiply by the numerator)

Repeat this procedure to identify fractional parts of a yard and mile.

5.10.07.02 **use word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard. e.g.,

> John jumped 60 inches in his school broad jump competition. How many feet did he jump? How many yards did he jump?

Say, "What information is given? What information are you asked to find? First, we must divide 60 inches by 12 to find the total number of feet John jumped. (5) Then we must transpose the number of feet into yards. How many yards are in 5 feet? (1) How many feet are left over? (2) How can we express the remaining feet as a fraction?" ($\frac{2}{3}$) Write several similar word problems on the chalkboard and elicit step-by-step solutions from the students.

STRATEGY 2: Write the following word problem on the chalkboard. e.g.,

> Jason is 54 inches tall. What is Jason's height in feet and inches?

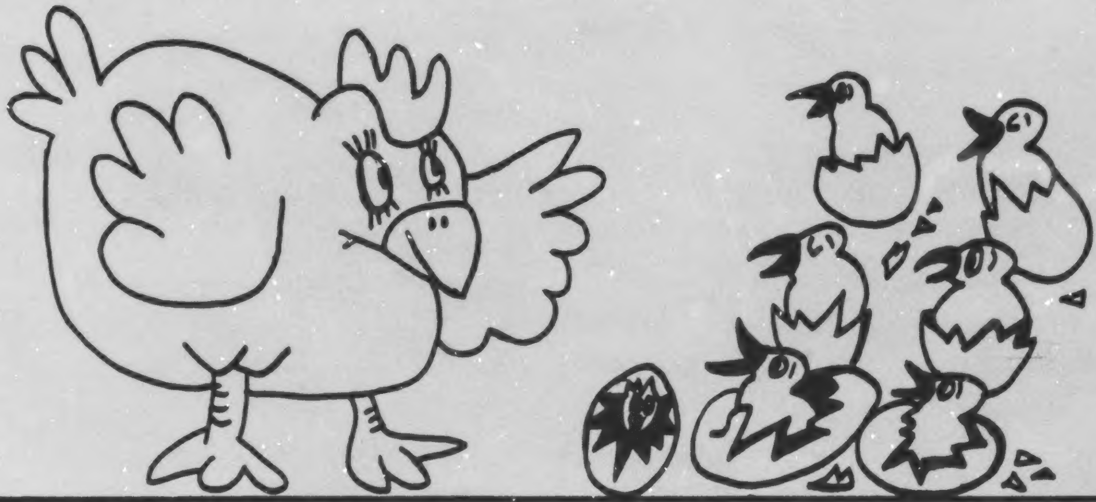
Say, "What information is given? What are you asked to find?" Ask the students to solve the problem.

Repeat this procedure using other problems.

P.O. 5.10.07.01

NAME: ______________________ CLASS: ________ DATE: ________

Match the measurements in column A with their equivalent measures in column B.



Column A	Column B
$1\frac{2}{3}$ yds.	60 in.
$6\frac{1}{4}$ ft.	4300 yds.
$1\frac{1}{2}$ mi.	75 in.
$12\frac{2}{3}$ yds.	13 ft.
$2\frac{1}{4}$ ft.	7,920 ft.
$4\frac{1}{3}$ yds.	27 in.
$2\frac{1}{2}$ mi.	38 ft.

P.O. 5.10.07.02

NAME: ____________________ CLASS: __________ DATE: ________

Read each problem and solve.

1. Ellen's baby sister was 18 inches long when she was born. What was her length in feet? What was her length in yards?

2. The distance between Mike's house and his neighbors house is 32 feet. How many yards are between Mike's and his neighbor's house?

3. A bookshelf is 84 inches high. What is its height in feet? What is its height in yards?

4. The width of the den wall in the Smith's home is 8½ feet. The Smith's are buying a wall unit that has a width of 98 inches. Will the wall unit fit?

5. The painter has enough paint to paint a wall that is $3\frac{2}{3}$ yards wide and $2\frac{2}{3}$ yards high. The wall he has to paint is 14 feet wide and 8 feet high. Will he have enough paint?

P.O. 5.05.02.03

NAME: ______________________ CLASS: ________ DATE: ________

Solve and check each problem.

WORK SPACE

1) A vegetable farm produced 23,495 kg of potatoes. The potatoes were packed in 62 crates. How many kg of potatoes were in each crate?

2) The hardware store has 1785 three inch nails. If the nails were sold in 25 packs with the same number in each pack, how many nails would be in each? How many nails would be left?

3) 2,009 new seats were bought for the auditorium. If there were 42 rows, how many seats were in each row if each row had the same number of seats? How many seats were left over?

4) Mr. Smith uses 12,494 gallons of gasoline for his car each year. How many gallons does he use each week if he uses the same amount each week? How many gallons are left?

5) A candy company made 50,064 lbs. of candy. They want to ship it to the stores in boxes of 25 lb. each. How many lbs. will be in each bag? How many extra lbs. of candy will there be?

Unit 54

5.10.08 TIME - FRACTIONAL RELATIONSHIPS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.08.01B identify the relationships among month and year;

e.g.,

6 months = $\frac{1}{2}$ year

5.10.08.02A identify the relationships among seconds, minutes and hours;

e.g.,

30 seconds = $\frac{1}{2}$ minute

$\frac{3}{4}$ hour = 45 minutes

5.10.08.03B identify a decade;

e.g.,

one decade = 10 years

1970 to 1980 = 1 decade

5.10.08.04B identify a century.

e.g.,

one century = 100 years

ten decades = 1 century

the 20th century = 1900 to 1999

VOCABULARY

TERMS

decade
century

GETTING STARTED

Prepare and display a clock face with moveable hands. Show 3:00. Ask a student to identify the time. Say, "What time will it be in one hour? ...in four and a half hours?" Show 5:00. Say, "Mother said dinner will be ready at 5:00. I have to wait 15 minutes. What time is it now?"

Repeat this procedure using other times.

Present the following calendar quiz. Ask the students to complete the sentences.

1) We celebrate our country's birthday on the ____ day of _____.
2) School starts at the beginning of the _____ month of the year.
3) School closes for summer at the end of the _____ month of the year.
4) Spring vacation is usually during the _____ month of the year.
5) The first day of winter is in the month of _____.
6) It is _____ days or _____ week from Monday through Sunday.
7) The first day of the calendar week is _____.
8) The last day of the calendar week is _____.
9) The month following May is _____.

Repeat this procedure using other calendar or time related questions.

5.10.08

5.10.08.01 **identify the relationship among month and year**

STRATEGY 1: Prepare twelve blocks each labeled with a month of the year. Say, "12 months are equal to one year." Ask a student to divide the twelve blocks in half. Say, "6 months equals $\frac{1}{2}$ year." Write this on the chalkboard. Ask another student to divide the twelve blocks into four equal parts. Say each part represents $\frac{1}{4}$ of a year. Say, "How many months are in $\frac{1}{4}$ of a year?" (3) Write this on the chalkboard. Ask a student to divide the blocks into three equal parts. Say, "Each part is $\frac{1}{3}$ of a year. How many months are in $\frac{1}{3}$ of a year? (4) How many months are in $\frac{2}{3}$ of a year?" (8) Write this on the chalkboard. Ask the students to copy the information into their notebooks. Write the following on the chalkboard.

18 months = $\underline{1\frac{1}{2}}$ years
27 months = __ years
16 months = __ years
44 months = __ years

Ask the students to express the number of months in years using mixed fractions.

STRATEGY 2: Write $\frac{1}{2}$ on the chalkboard. Say, "The denominator represents the number of equal parts into which the whole unit is broken. The numerator represents a part or parts of the unit. Into how many parts is one year broken? (12) How would you express one month as a fraction of a year?" ($\frac{1}{12}$) Repeat this procedure through $\frac{12}{12}$. Say, "Which fractions can be renamed in simpler form?" ($\frac{2}{12}$, $\frac{3}{12}$, $\frac{4}{12}$, $\frac{6}{12}$, $\frac{8}{12}$, $\frac{9}{12}$, $\frac{10}{12}$, $\frac{12}{12}$) Ask the students to rename each of these fractions in simplest form.

e.g.,

two months = $\frac{2}{12} = \frac{1}{6}$ of a year

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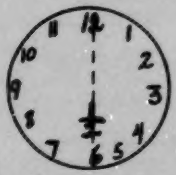
5.10.08

5.10.08.02 **identify the relationship among seconds, minutes and hours**

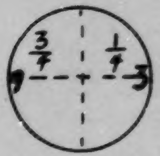
STRATEGY 1: Prepare and distribute circles. Say, "What units of time does a clock measure? (seconds, minutes, hours) We are going to explore ways to express time using fractions." Draw a large circle on the chalkboard. Ask the students to number the hours on the circle to resemble a clock. Illustrate on the chalkboard. Ask a student to work at the chalkboard. Say, "Do not draw hands on the clock. Divide the clock in half.

e.g.,



Write $\frac{1}{2}$ above the 6. Divide the clock into fourths by drawing a line between the 3 and 9.

e.g.,



3 marks $\frac{1}{4}$ of the clock and 9 marks $\frac{3}{4}$ of the clock. Label $\frac{1}{4}$ and $\frac{3}{4}$ on the clock." Ask a student to identify the 15 minute mark on the clock. Say, "What fraction of the hour does the 3 represent?" ($\frac{1}{4}$) Write 15 minutes = $\frac{1}{4}$ hours on the chalkboard. Ask a student to identify the 30 minute mark. Say, "What fraction of the hour does the 6 represent?" ($\frac{1}{2}$) Write 30 minutes = $\frac{1}{2}$ hour on the chalkboard. Ask a student to identify the 45 minute mark. Say, "What fraction of the hour does the 9 represent?" ($\frac{3}{4}$) Write 45 minutes = $\frac{3}{4}$ hour on the chalkboard.

Say, "Many clocks have a second hand. How many seconds are in a minute? (60) When the second hand rotates once around the clock, one minute has elapsed."

5.10.08

STRATEGY 1: cont'd

Ask a student to identify the 15 second mark. Say, "What fraction of a minute does the 3 represent?" ($\frac{1}{4}$) Write 15 seconds = $\frac{1}{4}$ minute on the chalkboard. Repeat this procedure to include 30 seconds = $\frac{1}{2}$ minute and 45 seconds = $\frac{3}{4}$ minute.

STRATEGY 2:

Prepare and display a large clock. Say, "60 minutes = 1 hour and 60 seconds = 1 minute. Into how many units is one hour divided? (60) How could we express 5 minutes as a fraction of an hour? ($\frac{5}{60}$) Is this fraction in simplest form?" (No) Ask the students to rename $\frac{5}{60}$ in its simplest form. ($\frac{1}{12}$) Repeat this process for other 5 and assorted minute intervals.

5.10.08.03 identify a decade

STRATEGY 1:

Write the word decade on the chalkboard. Ask a student to use a dictionary to look up the word and read the definition aloud. Write the definition on the chalkboard.

e.g.,

A decade is a period of ten years.

Say, "How many decades have you lived? How many decades has a person 40 years old lived?"

STRATEGY 2:

Say, "How many days are in one year? (365) How many weeks are in a year? (52) There is another term we can use when we discuss years. It is called a decade. A decade is equal to ten years."

Ask the students what the year would be one decade from now? (1994) What was the year one decade ago? (1974) Repeat this procedure.

5.10.08

5.10.08.04 **identify a century**

STRATEGY 1: Write the word century on the chalkboard. Ask a student to use a dictionary to define the word. Write a century is a period of 100 years on the chalkboard. Say, "This term is used to measure periods of time. In what century are we living?" Write the 20th century = 1900 - 1999 on the chalkboard. Say, "How many decades are in one century?" Write 10 decades = 1 century on the chalkboard.

STRATEGY 2: Write the following passage on the chalkboard.

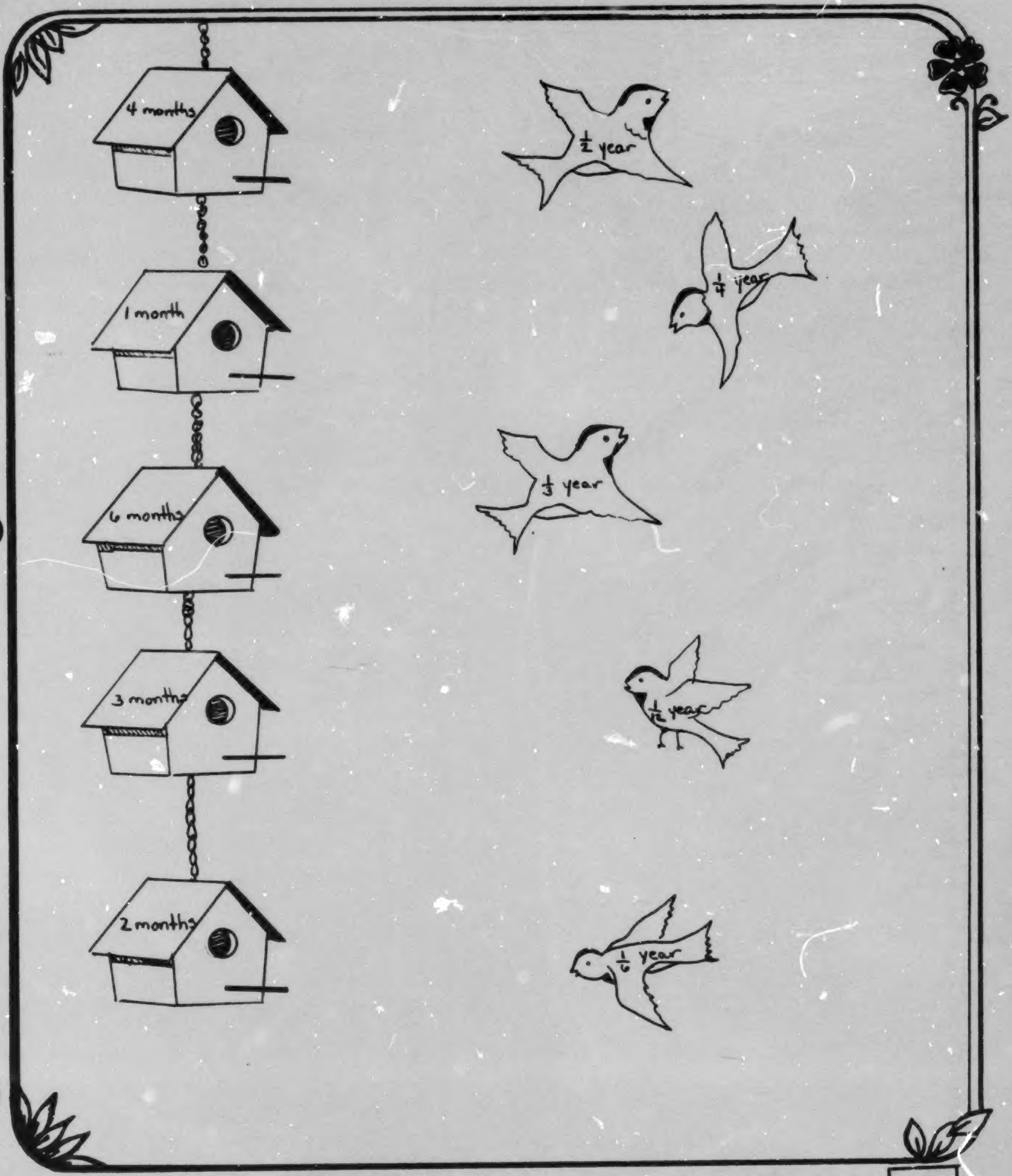
> Man has made many advancements between 1884 and 1984. During these 100 years man has invented the car, radio, T.V., telephone and thousands of other items. Man has also learned to fly and travel in space. This past century has certainly been one of rapid changes. Who knows what the next century will bring?

Ask the students to identify the length of one century. (100 years) Say, "What will the year be one century from now? (2084) What was the year a century ago?" (1884) Repeat this procedure.

P.O. 5.10.08.01

NAME:______________________________CLASS:__________DATE:________

Put the bird in its bird house by matching the number of months to the correct fraction.


4 months
1 month
6 months
3 months
2 months
$\frac{1}{2}$ year
$\frac{1}{4}$ year
$\frac{1}{3}$ year
$\frac{1}{12}$ year
$\frac{1}{6}$ year

P.O. 5.10.08.02

NAME: ______________________ CLASS: ________ DATE: ________

Use the information given to help you answer each question.

INFORMATION box

60 seconds = 1 minute

60 minutes = 1 hour

Sample Question

☐ minutes = $\frac{1}{2}$ hour

$\frac{1}{2}$ of 60 = 30

$\frac{1}{2}$ hour = $\boxed{30}$ minutes

☐ min. = $\frac{3}{4}$ hr.

☐ seconds = $\frac{1}{2}$ min.

☐ seconds = $\frac{1}{4}$ min.

☐ seconds = 2 min.

☐ seconds = 5 min.

☐ min. = $\frac{1}{4}$ hr.

☐ min. = $\frac{1}{6}$ hr.

180 sec. = ☐ min.

240 sec. = ☐ min.

540 sec. = ☐ min.

120 min. = ☐ hr.

160 min. = ☐ hr.

90 min. = ☐ hr.

20 min. = ☐ hr.

How many seconds are in one hour? (show all work.)

P.O. 5.10.08.03

NAME: ______________________ CLASS: ________ DATE: ______

Answer each question below.

10 years = 1 decade

1. 30 years = ☐ decades
2. 50 years = ☐ decades
3. 80 years = ☐ decades
4. ☐ years = 4 decades
5. ☐ years = 9 decades
6. ☐ years = 2 decades
7. What year will it be in 2 decades? __________
8. What year was it 4 decades ago? __________
9. My age is _____ decades and _____ years.
10. It is now 2003. What year was it 3 decades ago?

____

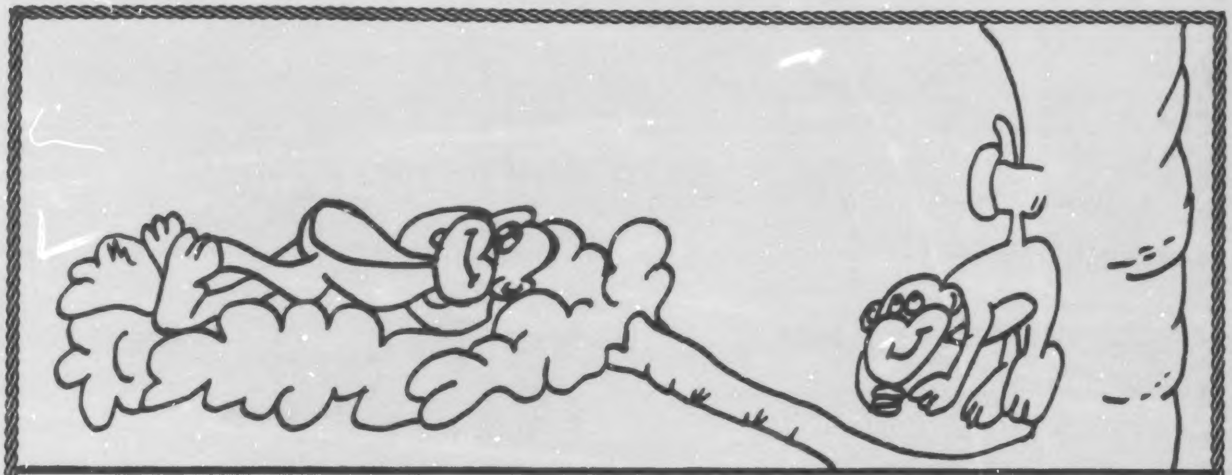
11. It is now 1776. What year will it be in 5 decades?

____

P.O. 5.10.08.04

NAME:____________________ CLASS:________ DATE:________

Draw a box around the time periods which are a century.



1776 - 1876 1940 - 1950 1632 - 1657

1983 - 2083 1540 - 1550

1801 - 1807 1492 - 1592 1923 - 1933

1970 - 1980 1980 - 1990

1926 - 1930 1845 - 1945 1700 - 1800

1675 - 1775 1901 - 1912

5.07.03 MULTIPLICATION OF DECIMALS THROUGH HUNDREDTHS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.07.03.01A multiply decimals by 10 and 100;

e.g.,

$10 \times 0.1 = 1$ $\quad$ $100 \times 0.1 = 10$

$10 \times 0.01 = 0.1$ $\quad$ $100 \times 0.01 = 1$

5.07.03.02A multiply decimals;

e.g.,

$$\begin{array}{r} 0.7 \\ \underline{x\ 3} \\ 2.1 \end{array} \qquad \begin{array}{r} 1.24 \\ \underline{x.30} \\ 0.3720 \end{array}$$

5.07.03.03A solve word problems related to skills learned in this module.

e.g.,

Find the area of a room that measures 9.1 feet by 12.6 feet.

e.g.,

$$\begin{array}{r} \\ 12.6 \\ \underline{x\ 9.1} \\ 1\ 26 \\ \underline{113\ 40} \\ 114.66 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 9.1 \\ \underline{x12.6} \\ 5\ 46 \\ 18\ 20 \\ \underline{91\ 00} \\ 114.66 \end{array}$$

GETTING STARTED

Prepare and distribute unlined paper. Ask the student to fold the paper into eight boxes. Say, "I will give you eight multiplication examples using multiples of 10 and 100. When I say write, put just your answer in one box. 10 x 10. Write."

Repeat this procedure. Read the answers and ask the students to check their work.

Prepare three sets of 30 cards. One set will have decimals, one set corresponding words and the third set corresponding fractions. Place the cards on the chalkboard ledge and ask the students to rearrange the cards and match them.

e.g.,

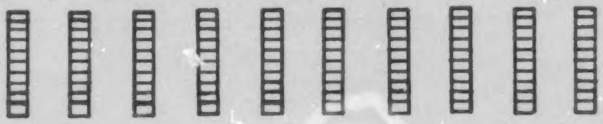
.1	1 tenth	$\frac{1}{10}$

5.07.03

5.07.03.01 multiply decimals by 10 and 100

STRATEGY 1: Prepare and distribute squared material. (10 ten strips, 10 units and 1 hundred card) Write 10 x .1 = ☐ on the chalkboard. Say, "Let the hundred square equal 1 whole. Display 10 tenths."

e.g.,



Say, "If we put the 10 tenths together, what do we have?" (one whole unit) Write 10 x .1 = 1 on the chalkboard. Say, "What happened to the decimal point?" (The decimal point is removed because we have one whole and zero tenths.)

Repeat this procedure to include multiplication by hundreds.

STRATEGY 2: Prepare and distribute sheets of centimeter graph paper. Say, "This sheet of graph paper equals one whole. Each square represents one hundredth. Shade in 10 groups of three hundredths. How many boxes are shaded? (30) What does 30 hundredths equal?" (3 tenths)

Write 10 x 0.03 = 0.3 on the chalkboard. Say, "When we multiply a decimal by 10, we move the decimal point one place to the right."

Repeat this procedure for other examples, multiplying decimals by 10 and 100.

5.07.03

5.07.03.02 **multiply decimals**

STRATEGY 1: Write $\begin{array}{r} 2.7 \\ \underline{\times\ 3} \end{array}$ on the chalkboard. Say, "When we multiply decimals we proceed as we do with whole numbers. There is an easy way to figure out where to place the decimal point in the product." Ask a student to perform the multiplication ignoring the decimal point.

e.g.,

$$\begin{array}{r} 2.7 \\ \underline{\times\ 3} \\ 8\ 1 \end{array}$$

Point to the first factor (2.7). Say, "How many places are to the right of the decimal point? (1) Look at the second factor. How many places are to the right of that number? (0) Add these two numbers. (1 + 0 = 1) The answer tells us the number of digits that are to the right of the decimal point in our product." Place the decimal point in the example on the chalkboard, e.g., 8.1.

Repeat this procedure using other numbers.

STRATEGY 2: Prepare and distribute ten strips. Say, "Display 3 x 0.2 on your desk. What do three groups of 2 tenths equal?" (0.6) Write $\begin{array}{r} 0.2 \\ \underline{\times\ 3} \\ 0.6 \end{array}$ on the chalkboard.

Say, "When multiplying decimals, proceed as with whole numbers. Count the number of places to the right of the decimal point in both factors. That is the number of places to the right of the decimal point in the product."

Repeat this procedure using other words.

5.07.03

5.07.03.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write a word problem on the chalkboard.

e.g.,

John bought 4 books for $1.33 each. How much did he spend in all?

Ask the students for the correct operation. (Multiply) Say, "What are the steps in solving a problem? (1) Read, (2) decide, (3) solve, and (4) answer."

Ask the students to solve the problem.

e.g.,

$$\begin{array}{r} \$1.33 \\ \underline{\times \quad 4} \\ \$5.32 \end{array}$$

STRATEGY 2: Write the following word problem on the chalkboard.

e.g.,

Mr. Johnson can drive 25.7 miles on 1 gallon of gasoline. How far can he drive on 6 gallons of gasoline?

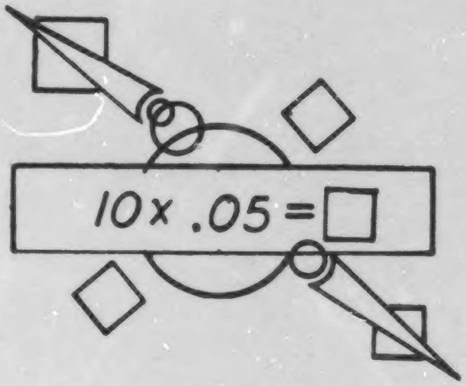
Ask the students to use correct problem solving techniques to solve the problem.

Repeat this procedure using other problems.

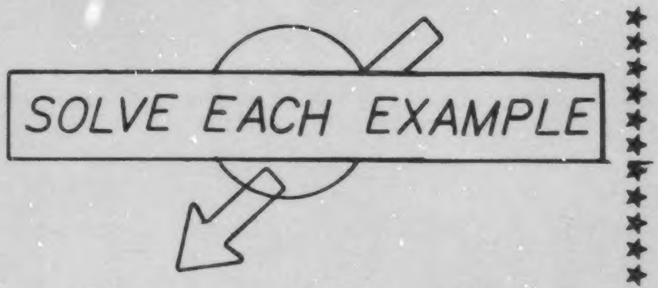
P.O. 5.07.03.01

NAME: ______________________ CLASS: ________ DATE: ________

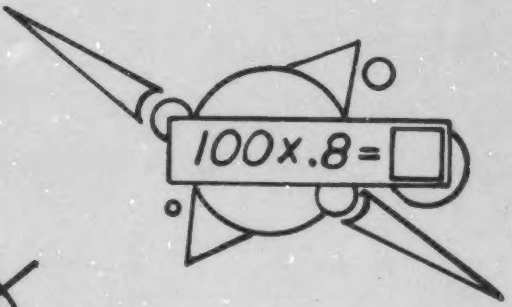
Solve each example.



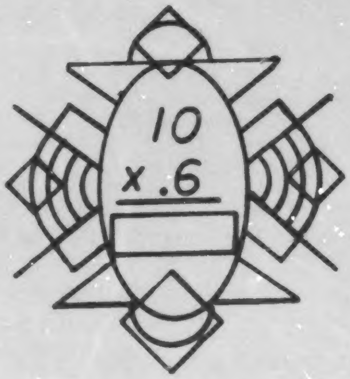
$10 \times .05 = \square$



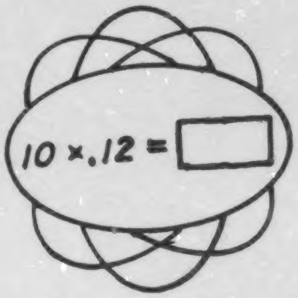
SOLVE EACH EXAMPLE



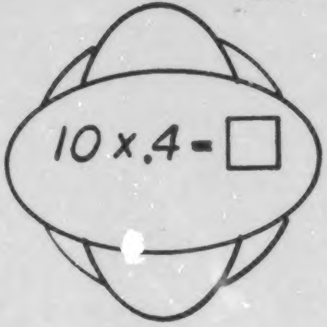
$100 \times .8 = \square$



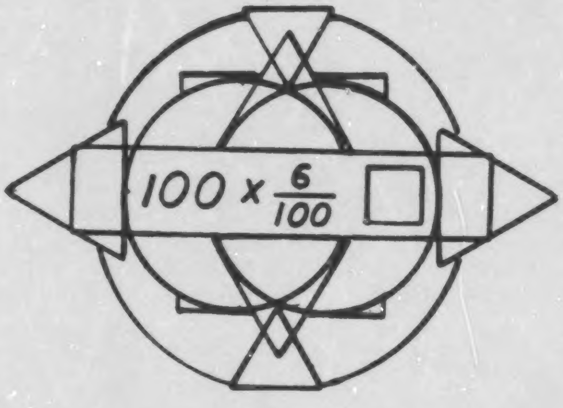
$$\begin{array}{r} 10 \\ \times .6 \\ \hline \square \end{array}$$



$10 \times .12 = \square$



$10 \times .4 - \square$



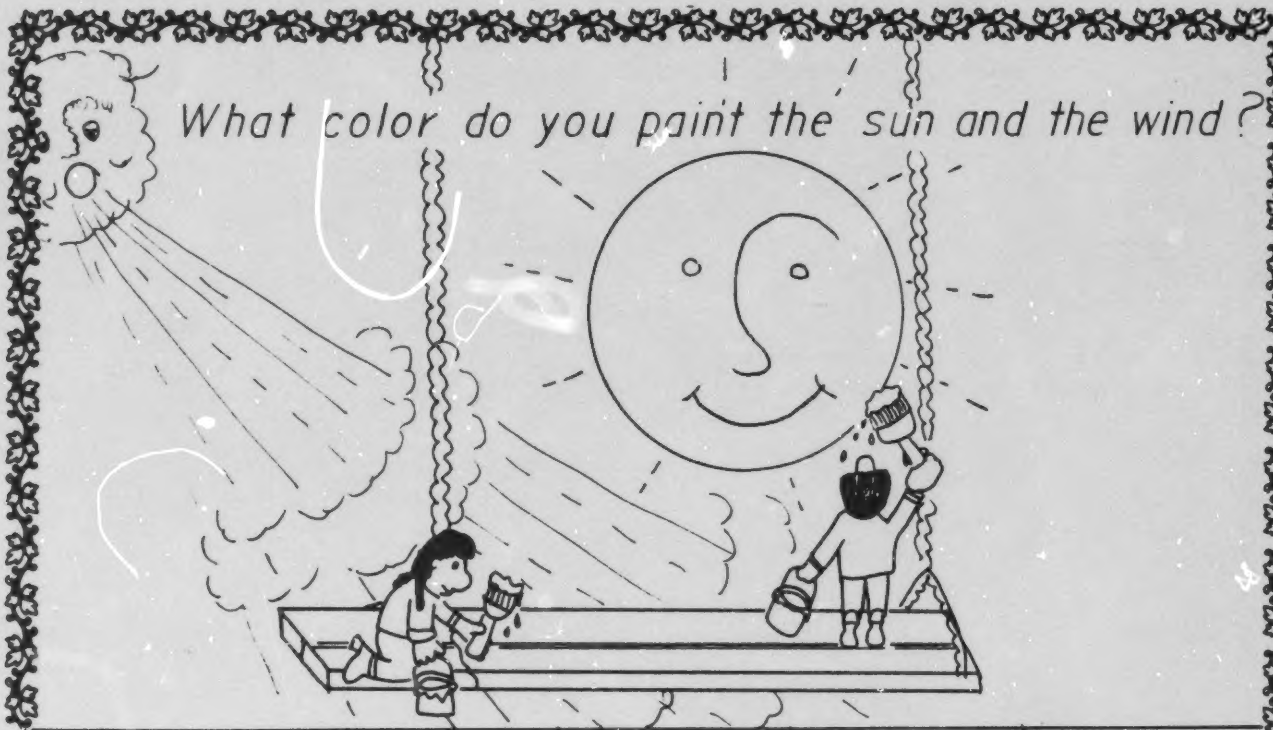
$100 \times \frac{6}{100} \ \square$

$$\begin{array}{r} 100 \\ \times .4 \\ \hline \square \end{array}$$

P.O. 5.07.03.02

NAME:____ CLASS:__________ DATE:________

Multiply. Use the key to solve the riddle.



What color do you paint the sun and the wind?

The SUN.	5.2 0.7 3.64 R	0.24 0.25 ___	0.15 0.64 ___	1.6 2.3 ___
The WIND.	5.54 2.63 ___	8.91 .72 ___	6.4 .8 ___	2.3 1.6 ___

KEY	B	E	L	O	R	S	U
	14.5702	3.68	6.4152	0.06	3.64	0.096	5.12

P.O. 5.07.03.03

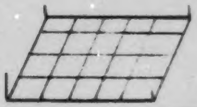
NAME: ______________________ CLASS: ________ DATE: ________

Solve each problem. Remember to put the decimal point in the correct place.

Work Space

1. Jose's mother is buying tile for her kitchen. The kitchen measures 8.4 feet by 13.7 feet. How many square feet of tile does she need?

______



2. Maria wants to make three dresses. Each dress requires 3.7 yards of material. How much material does she need?

______

3. Carol has 12 pieces of ribbon. Each piece measures 17.5 yards. How many yards of ribbon does she have?

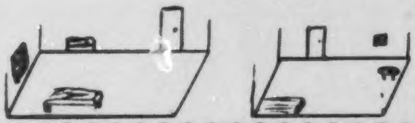
______

4. Phillip jogs. 0.7 miles everyday. How many miles does he jog in 14 days?

______

5. George and David are brothers. They are arguing about the size of their rooms. George's room is 9.1 feet by 12.6 feet. Davids room is 8.3 feet by 13.7 feet. Who has the bigger room?

______



5.07.04 DIVISION OF DECIMALS THROUGH HUNDREDTHS

(4 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.07.04.01A divide a decimal by a whole number through hundredths;
e.g.,

$$3\overline{)9.99}$$

5.07.04.02A use the identity element (1) to obtain equivalent decimal fractions;
e.g.,

$$\frac{.40}{.10} \times \frac{10}{10} = \frac{0.4}{0.1} = 0.4$$

5.07.04.03A solve word problems related to skills learned in this module.
e.g.,
Sara bought 5 bags of sunflower seeds. Her total cost was \$10.50. How much was the cost of each bag?

$$\begin{array}{r} \$\ 2.10 \\ 5\overline{)\$10.50} \end{array}$$ for each bag

check

$$\begin{array}{r} \$2.10 \\ \underline{\times \quad 5} \\ \$10.50 \end{array}$$

5.07.04

VOCABULARY

TERMS

dividend
quotient
decimal

GETTING STARTED

Write the following examples on the chalkboard.

e.g.,

$6\overline{)36}$ $\qquad\qquad$ $\square \times 6 = 36$

Say, "A quick way to remember a division fact is to relate it to multiplication. Look at the example on the chalkboard. How many groups of 6 are in 36? What number times 6 equals 36? 6 x 6 = 36, therefore, 6 is the quotient."

Repeat this procedure for other division facts.

Prepare a set of division fact flash cards.

Play "Division Bee". Ask the students to stand. Show the first student a card, e.g., $\boxed{49 \div 7 = \triangle}$. Ask the student for the quotient. If the answer is correct, the student remains standing.

Repeat this procedure using the other cards. The last student to remain standing is the winner.

5.07.04

5.07.04.01 **divide a decimal by a whole number through hundredths**

STRATEGY 1: Prepare play money (five dollar bill, five one dollar bills and six quarters). Write the following problem on the chalkboard.

> Carmen and Peter earned $5.50 selling aluminum cans to a recycling center. They divided the money evenly. How much money did each one receive?

Display a five dollar bill and two quarters. Say, "If Carmen and Peter want to divide the $5.00 bill equally, what must they do? (Exchange the $5.00 bill for 5 singles.) Peter and Carmen will each get 2 dollars and 1 one dollar bill is left over." Write the following on the chalkboard.

```
     2———>what Peter and Carmen took
  ─────
  2)5.50
    4.00  amount given out
    ────
    1.50  remainder
```

Say, "Peter and Carmen now have a one dollar bill and two quarters. What must be done? (Exchange the dollar for 4 quarters; we now have 6 quarters.) Can the $1.50 be divided equally? (Yes) How much does each child get? (75¢) How much did each child earn? ($2.75) The decimal point in the dividend tells us where the decimal point in the quotient will be."

Repeat this procedure for other problems.

STRATEGY 2: Write $2\overline{)11.64}$ on the chalkboard. Say, "To divide decimals, you divide as for whole numbers." Ask a student to do the division at the chalkboard. e.g.,

```
     5 82
  ───────
  2)11.64
```

STRATEGY 2: cont'd

Say, "Place the decimal point in the quotient in line with the decimal point in the dividend." e.g.,

$$\begin{array}{r} 5.82 \\ 2\overline{)11.64} \end{array}$$

Repeat this procedure using other numbers.

5.07.04.02 **use the identity element (1) to obtain equivalent decimal fractions**

STRATEGY 1: Prepare and distribute 10 discs and 10x10 centimeter graph paper. Say, "Display six discs. How can we express this arrangement as a multiplication example?" (1 x 6 = 6) Display nine discs. Say, "What multiplication example expresses this arrangement? (1 x 9 = 9) What happens when we multiply a number by one? The product of any number times 1 is the number itself. One is called the identity element. There are many names for one (1). One (1) can be expressed as a fraction, e.g., $\frac{1}{1} = 1$. To find the equivalent decimal fractions, we can multiply the decimal by 1 or $\frac{1}{1}$." Write the following on the chalkboard.
e.g.,

$$\frac{.40}{.10} \times \frac{1}{1} = \frac{0.4}{0.1} = 0.4$$

Say, "0.40 equals 40 hundredths. 0.10 equals 10 hundredths. How many hundredths equal a tenth? (10) We have regrouped the hundredths into tenths by multiplying the numerator and denominator by 1. How many tenths do we have? (4) Therefore, 0.40 is equivalent to 0.4."

STRATEGY 2: Ask the students for fractional equivalents of 1.

e.g.,

$$\frac{3}{3} = 1,\ \frac{5}{5} = 1,\ \frac{9}{9} = 1,\ \frac{10}{10} = 1$$

Say, "You can multiply a decimal fraction by 1 or $\frac{10}{10}$ to obtain an equivalent decimal fraction.

e.g.,

$$\frac{0.24}{0.8} \times \frac{10}{10} = \frac{2.4}{8} = 0.3$$

Repeat this procedure using other examples.

5.07.04.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

Susan walked 21.15 miles in 3 days. How many miles did she walk per day?

Say, "What does 3 represent? (3 miles) What does 21 represent? (21 miles) What does 0.15 represent? ($\frac{15}{100}$ of a mile, 1 tenth and 5 hundredths) Let's divide the whole number." Ask a student to go to the chalkboard, write the example, and show the division of the whole number.

e.g.,

```
             1
          3)3.15
(1x3)      -3
             .15
```

Say, "Can we divide one tenth into three equal parts? (No) Regroup one tenth for ten hundredths. How many hundredths do we now have? (15) How many in each group?" (5) Ask a student to come to the chalkboard and show the division.

e.g.,

```
   1.05
3)3.15
```

Say, "Susan walked 1.05 miles a day."

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STRATEGY 2: Write the following word problem on the chalkboard.
e.g.,

> Maria bought 7 bags of chocolate candies.
> Her total cost was $9.73. What was the
> cost of each bag?

Ask a student to read the problem. Say, "Which operation is necessary to solve this problem?" Write the steps for solving word problems on the chalkboard.
e.g.,

1) Read the problem.
2) List the key word facts and number facts.
3) Choose the correct operation.
4) Write a number sentence.
5) Estimate the answer.
6) Solve the number sentence.
7) Check your answer.

Ask the students to solve the problem.
e.g.,

```
                $1.39
              7)$9.73
(100x7)          7 00
                 ----
                 2 73
 (30x7)          2 10
                 ----
                   63
  (9x7)            63
                   --
```

Repeat this procedure using other word problems.

P.O. 5.07.04.01

NAME: ____________________ **CLASS:** ________ **DATE:** ________

Divide.

$54 \div 9 = \square$

$\square \times 9 = 54$

DIVIDE

$3.06 \div 3 = \square$

$\square \times 3 = 3.06$

$5\overline{)46.5}$

$6\overline{)40.8}$

$3\overline{)104.1}$

$\$6.00 \div 2 = \square$

$2\overline{)\$6.00}$

$\$3.46 \div 2 = \square$

$\$4.13 \div 7 = \square$

P.O. 5.07.04.02

NAME: ____________________ CLASS: __________ DATE: __________

Write equivalent decimal fractions by multiplying by fractions equivalent by 1.

Example:

$$\frac{.28}{.56} = \frac{.28}{.56} \times \frac{100}{100} = \frac{28}{56}$$

1. $\frac{.4}{.8} =$	2. $\frac{.2}{.6} =$	3. $\frac{.3}{.9} =$
4. $\frac{.39}{.78} =$	5. $\frac{.45}{.90} =$	6. $\frac{.66}{.22} =$
7. $\frac{.500}{.250} =$	8. $\frac{.276}{.552} =$	9. $\frac{.333}{.666} =$

P.O. 5.07.04.03

NAME:________________________ CLASS:________ DATE:________

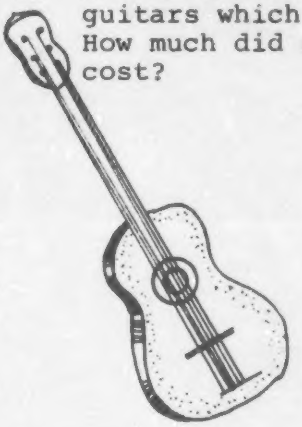
Solve.

Example

John bought 4 long playing records. He paid $22.95. Each record cost the same amount. How much did he pay for 1 record?

$$\begin{array}{r} \$\,5.74 \\ 4\,\overline{)\,\$22.96} \\ 20 \\ \hline 2\,9 \\ 2\,8 \\ \hline 16 \\ -16 \\ \hline 0 \end{array} \qquad \begin{array}{r} \$\,5.74 \\ \times\ 4 \\ \hline \$\,22.96 \end{array}$$

1. The school band bought 2 guitars which cost $135.50 How much did each guitar cost cost?



2. Mr. Rivera wants to split $475.50 among his four children. How much money will each receive?

3. A class of 28 students sold candies for the amount of $105.00. What was the avera average sale per student?

4. Mrs. Johnson wants to split $332.80 equally among the 32 students in her class. How much money will each student get?

Unit 57

5.01.06 PLACE VALUE THROUGH HUNDRED MILLIONS

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.06.01A identify and write a 7-, 8-, or 9-digit number in standard and expanded form; e.g.,

108,436,118 = 100,000,000 + 8,000,000 +
400,000 + 30,000 + 6,000 +
100 + 10 + 8

5.01.06.02B compare two 6-, 7-, 8-, or 9-digit numbers using the correct relation symbol (<, >).
e.g.,

108,436,118 > 107,849,101

5.01.06

VOCABULARY

TERMS	SYMBOLS
expanded notation	
less than	<
equal to	=
greater than	>

GETTING STARTED

Draw a place value chart on the chalkboard through hundred thousands. Prepare a set of cards numbered 0 through 9 and place them in a paper bag. Ask a student to come to the front of the classroom and pick one card from the bag. Ask another student to write the number written on the card in the chart starting in the ones place. Repeat this procedure until all six columns are filled. Ask another student to read the number.

Repeat this procedure reversing the order, e.g., start at hundred thousands place.

Draw a place value chart on the chalkboard through hundred thousands. Write the digits 0 through 9 on the side of the chalkboard. Ask students to come to the front of the classroom and write a number in the place value chart starting in the ones place. Erase the number that has been used from the digits list. Repeat this procedure with other students until the chart is completed. Ask a student to read the number and ask another student to write the number in expanded notation.

Repeat this procedure.

5.01.06

5.01.06.01 **identify and write a 7-, 8-, or 9-digit number in standard and expanded form**

STRATEGY 1: Write 57,842,169 on the chalkboard. Say, "In this number, what is the value of the digit 5?" Write 50,000,000 on the chalkboard. Say, "What does the digit 7 represent?" Write the following on the chalkboard.

50,000,000 + 7,000,000

Repeat this procedure until the standard number is written in expanded form.

e.g.,

50,000,000 + 7,000,000 + 800,000, + 40,000 + 2,000 + 100 + 60 + 9

Repeat this procedure using other 7-, 8-, or 9-digit numbers. Reverse the procedure by presenting the expanded number first.

STRATEGY 2: Prepare and distribute graph paper, scissors and glue. Ask the students to outline a 7x7 grid. Say, "Write 1,000,000 on the first line, 700,000 on the second line, 80,000 on the third line, 3,000 on the fourth line, 900 on the fifth line, 20 on the sixth line and 5 on the seventh line. Cut the grid into seven strips horizontally. Look at your strips. Which strip has the largest number? (1,000,000) Place that strip on your desk. Which strip has the next largest number? (700,000) Paste the 700,000 strip on top of the 1,000,000 strip so that the columns line up. What number do we have now?" (1,700,000) Ask the students to continue pasting the strips one upon the other until the number 1,783,925 is reached. Say, "We started with an expanded number and changed it to a standard number." Ask a student to read the standard number.

5.01.06

5.01.06.02 **compare two 6-, 7-, 8-, or 9-digit numbers using the correct relation symbol (<, >)**

STRATEGY 1: Construct a place value chart on the chalkboard. e.g.,

MILLIONS	THOUSANDS	HUNDREDS
H T O	H T O	H T O

Ask the students to place the following numbers in the place value chart.

1) 108,436,118
2) 107,849,101

Say, "How can you tell which number is greater?" Ask the students to compare the value of the digits in each place. Starting from the left, the digits in the hundred millions place are the same. The digit in the ten millions place are the same. The digits in the one millions place differ. The digit 8 is greater than 7, therefore, the first number is greater than the second. Write 108,436,118 > 107,849,101.

Ask students to write other numerical pairs of 6-, 7-, 8-, or 9-digits and determine the proper relation symbols.

STRATEGY 2: Write the following numbers on the chalkboard.

729,415 ○ 829,415
3,925,419 ○ 3,825,419
6,329,345 ○ 6,230,123

Say, "Look at the first pair of numbers. Which number is greater?" Write the appropriate relation symbol in the circle.

Repeat this procedure using other pairs of 6-, 7-, 8-, or 9-digit numbers.

P.O. 5.01.06.01

NAME: ______________________ CLASS: __________ DATE: ________

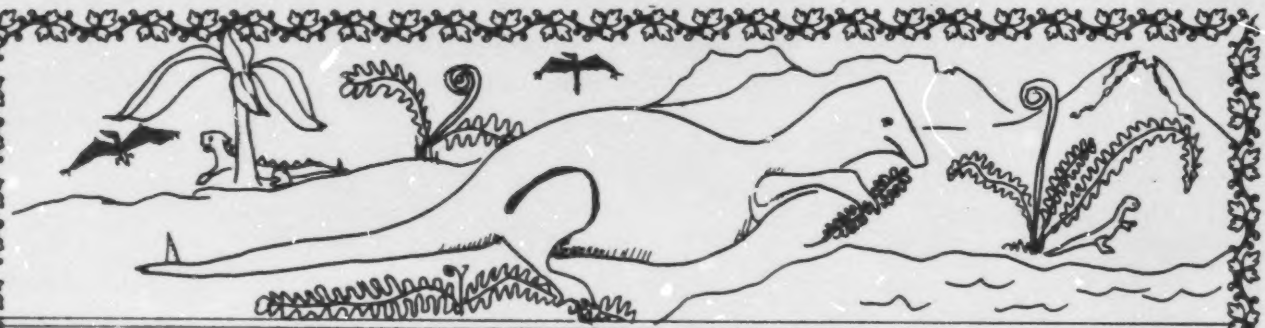
I. Write in expanded notation.
II. Write the standard number.

I	II
1. 5,320,425 5,000,000 + 300,000 + 20,000 + 400 + 20 + 5 ________	7 100,000,000 + 30,000,000 + 300,000 + 20,000 + 1,000 + 400 + 20 + 6 130,321,426
2. 7,421,925 ________ ________	8 200,000,000 + 30,000,000 + 5,000,000 + 4,00,000 + 20,000 + 1,000 + 600 + 40 + 9 ________
3. 9,124,295 ________ ________	3,000,000 + 400,000 + 50,000 + 1,000 + 600 + 90 + 4 9 ________
4. 25,290,421 ________ ________	20,000,000 + 1,000,000 + 500,000 + 20,000 + 5,000 + 300 + 70 + 5 ________ 10
5. 75,621,042 ________ ________	400,000,000 + 20,000,000 + 500,000 + 30,000 + 2,000 + 400 + 20 + 5 11 ________
6. 97,217,409 ________ ________	5,000,000 + 200,000 + 90,000 + 1,000 + 200 + 40 + 7 12 ________

P.O. 5.01.06.02

NAME: ______________________ CLASS: ________ DATE: ________

Which numeral is greater than the other. Write (<, > or =)



1. 425,533 ○ 435,353

2. 990,625 ○ 991,256

3. 6,295,429 ○ 6,275,924

4. 7,500,479 ○ 8,500,974

5. 78,629,421 ○ 79,926,214

6. 89,923,497 ○ 90,923,497

7. 251,421,562 ○ 261,124,123

8. 390,450,686 ○ 391,416,490

9. 945,359,416 ○ 946,953,164

10. 678,214,265 ○ 688,142,625

Unit 58

5.04.05 MULTIPLICATION OF 3- AND 4-DIGIT NUMBERS BY 3-DIGIT NUMBERS

(lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.04.05.01B multiply 3- and 4-digit numbers by a 3-digit number;

e.g.,

	123
	x321
(1 x 123)	123
(20 x 123)	2460
(300 x 123)	36900
(321 x 123)	39483

5.04.05.02B solve word problems related to skills learned in this module.

e.g.,

At our school Mrs. Smith has 321 boxes of markers. There are 144 markers in each box. How many markers does she have?

	321
	x144
(4 x 321)	1 284
(40 x 321)	12 840
(100 x 321)	32 100
(144 x 321)	46,224

Mrs. Smith has 46,224 markers

VOCABULARY

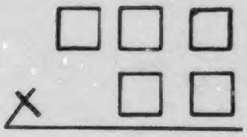
TERMS

factors
product
greatest
strategy
partial

GETTING STARTED

Prepare a die. Draw the following diagram on the chalkboard and ask the students to copy it into their notebooks.

e.g.,



Roll the die and call out the number. Ask the students to place that number in any box. Repeat this procedure until all five boxes have been filled. Ask the students to multiply. Ask a student to read his/her product. Say, "Does anyone have a greater product?" The student with the greatest product now tosses the die for a new game.

Prepare a set of 12 cards, six cards having a multiplication example whose factors are multiples of ten and six cards with matching products.

e.g., $\boxed{10 \times 60}$ $\boxed{600}$

Divide the class into two teams. Select a player from team A to pick two cards and try to make a match. If the cards match, he/she keeps the two cards for his/her team. If the cards do not match, the cards are returned (face down) to their original position. A player from the other team then goes. The game continues until there are no cards left. The team with the greatest number of cards wins the game.

5.04.05

5.04.05.01 **multiply 3- and 4-digit numbers by a 3-digit number**

STRATEGY 1: Write $\begin{array}{r} 123 \\ \underline{x321} \end{array}$ on the chalkboard. Say, "How can we rename 321? (300 + 20 + 1) Since 321 can be renamed as ones, tens and hundreds, there are really three parts to our example." Ask a student to point to the first step in the example. (123 x 1) Use colored chalk and box-off this part of the example. Ask a student to do this multiplication on the chalkboard.

e.g., $$\begin{array}{r} 123 \\ \underline{x321} \\ 123 \end{array}$$

Say, "This is one partial product. The second part of the example is 123 times 2 tens." Erase the first colored box and outline step 2. Ask a student to multiply.

e.g., $$\begin{array}{r} 123 \\ \underline{x321} \\ 123 \\ 2460 \end{array}$$

Say, "This is the second partial product. The third part of the example is 123 x 300." Erase the second box and use the colored chalk to outline the third box. Ask a student to multiply.

e.g., $$\begin{array}{r} 123 \\ \underline{x321} \\ 123 \\ 2,460 \\ \underline{36,900} \end{array}$$

Say, "36,900 is the third partial product. We get our final product by adding the partial products." Ask a student to add the partial products.

e.g., $$\begin{array}{r} 123 \\ 2,460 \\ \underline{+36,900} \\ 39,483 \end{array}$$

Note: Ask the students to hold their papers vertically, this provides columns. It eliminates errors due to poorly aligned numbers.

STRATEGY 2: Write $\begin{array}{r}123\\ \underline{\text{x}321}\end{array}$ on the chalkboard. Ask a student to multiply by the ones place.

e.g., $\begin{array}{rl}123 & \\ \underline{\text{x}321} & \\ 123 & (1 \text{ x } 123)\end{array}$

Say, "What is the second part of the example?" (20 times 123) Write the product 2,460 below the problem. Say, "Is this the answer?" (No, it is only the result of multiplying 123 by 20.) Ask a student to multiply by 300 and record the product. Say, "How can we find the final product?" (add the partial products)

Repeat this procedure using other numbers.

5.04.05.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> A store has 321 boxes of markers. Inside of each box there are 144 markers. How many markers does the store have?

Ask the students to choose the correct operation to solve the problem. (multiply) Ask another student to write the example.

e.g., $\begin{array}{r}321\\ \underline{\text{x}144}\end{array}$

Ask a student to solve the example.

e.g., $\begin{array}{rl}321 & \\ \underline{\text{x } 144} & \\ 1{,}284 & (4 \text{ x } 321)\\ 12{,}840 & (40 \text{ x } 321)\\ \underline{32{,}100} & (100 \text{ x } 321)\\ 46{,}224 & \end{array}$

Ask another student to label the answer.

STRATEGY 2: Present the following problem to the class.

> To cross over the Whitestone bridge it costs $1.25. At the end of the day the toll collector must count his money and hand it to his supervisor. If 623 cars passed his booth, how much money did he collect?

Say, "We are going to act this out." Give each child one ticket worth $1.25. Say, "Come up one at a time and give your ticket to (student). Now that (student) has 32 tickets, how much money does he/she have?" Elicit ways of solving the problem. Say, "We could add $1.25 + $1.25 + $1.25... or we could multiply $1.25 x 32. Now if (student) collected 623 tickets, how much money does he/she have?" Have the student record the example on a sheet of paper while one student does it on the chalkboard.

e.g.,

```
    6.23
  x$1.25
   31.15       (5 x 623)
  124.60      (20 x 623)
  623.00     (100 x 623)
 $778.75
```

277

P.O. 5.04.05.01

NAME: ______________________ CLASS: ________ DATE: ________

Multiply. Look for the product in the answer column. If you find the product color the circle. If you can't find the answer leave the circle blank. Connect the colored circles.

123
×225

763
×581

666
×235

348
×138

137
×373

183
×321

268
×556

199
×731

247
×235

Answers

149,008

51,101

58,743

27,675

58,045

48,024

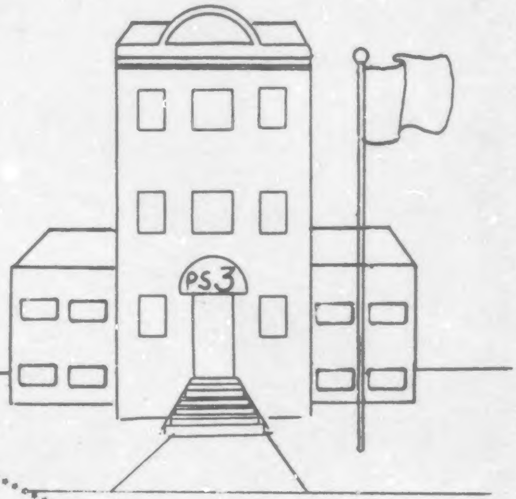
156,510

P.O. 5.04.05.02

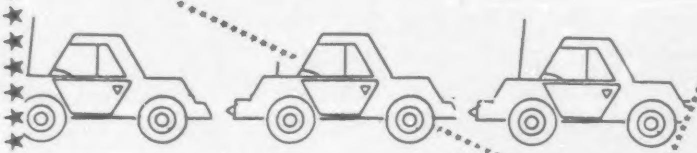
NAME: ______________________ CLASS: __________ DATE: ________

Solve the problems.

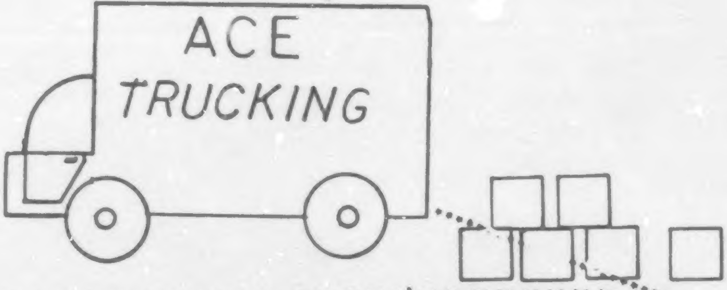
There are 153 schools in a city. Each school has 364 students. How many students are in the city's schools?



A store has 372 boxes of toy cars. Each box contains 114 cars. How many cars are in the store?



A truck can carry 346 crates. If a company owns 123 trucks, what is the greatest number of crates it can carry at one time?



5.13.05 PROBLEM SOLVING: GUESS AND CHECK

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.13.05.01A check guesses against problem conditions in addition problems;

e.g.,

The sum of three consecutive* numbers is 219. What are these three numbers?

*Numbers which differ by one such as 5, 6, 7.

5.13.05.02A check guesses against problem conditions in multiplication problems;

e.g.,

Place the numbers 1 through 9 in a hat. Pick four numbers out of the hat. Use each number only once. What is the greatest (smallest) product you can get?

$$\begin{array}{r} \square\square \\ \times\ \square\square \\ \hline \end{array}$$

5.13.05.03A check guesses against problem conditions.

e.g.,

How many times could you subtract 43 from 39,879 to show a number less than 43 on a calculator's printout?

5.13.05

VOCABULARY

TERMS

consecutive
odd
even

GETTING STARTED

Play "Guess My Number". Say, "I am thinking of a number between one and ten. It is an even number. It is smaller than eight but bigger than four." Ask students to guess the number.

Repeat using other numbers.

Ask three students to come to the front of the classroom. Pretend to put something in each student's hand but actually give a chip to only one student. Say, "Who can guess which student has the chip?"

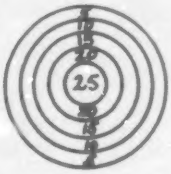
Repeat this procedure several times.

5.13.05

5.13.05.01 **check guesses against problem conditions in addition problems**

STRATEGY 1: Say, "The sum of three consecutive odd numbers is 207. What are these three numbers? What are consecutive odd numbers?" (Three odd numbers in order, e.g., 1, 3, 5.) Elicit combinations from the students. Say, "Are these the correct numbers? How can we find out? (Add the three numbers and check the sum against 207.) The best way to start is to choose numbers whose sum would be a three-digit number." The students will guess and check until the correct numbers are found.

STRATEGY 2: Draw the following on the chalkboard.
e.g.,



Say, "Marisol likes to play darts. She scored 65 points using 6 darts. How did she get this score?" Ask the students for different combinations which would equal 65.

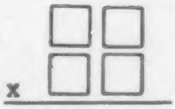
5.13.05.02 **check guesses against problem conditions in multiplication problems**

STRATEGY 1: Say, "We are going to play a number game. Draw the picture in your notebook that I draw on the

5.13.05

STRATEGY 1: cont'd chalkboard.

e.g.,



I am going to call out four numbers. You may use each number only once. You may only write one number in each box. You may not change the position of the number. When I finish calling the numbers find the product. Points will be given to the students who have the greatest product." Call the following numbers: 6, 3, 5, 2. Repeat this procedure using other numbers and asking the students to find the smallest product.

STRATEGY 2: Say, "I am thinking of two odd numbers that have a sum of 44 and a product of 483. What are the two numbers?" Encourage the students to guess and check until the correct pair of numbers are found.

5.13.05.03 check guesses against problem conditions

STRATEGY 1: Adapt Strategy 2 used in P.O. 5.13.05.02.

STRATEGY 2: Say, "How many times can I subtract 43 from 39,879 until I have less than 43?" Ask the students for estimates. Record the student's name and estimate on the chalkboard. Say, "How can I check my estimates?" (This can be checked by dividing 39,879 by 43.)

Repeat this procedure using other examples.

P.O. 5.13.05.01

NAME: ____________________ CLASS: __________ DATE: __________

Cut out the numbered squares. Place them face down on your desk. Pick several numbers. Write the numbers in the boxes in the first example. Try to make the greatest product.

☐ ☐
× ☐ ☐
______

☐ ☐ ☐
× ☐
______

☐ ☐
× ☐ ☐
______

☐ ☐ ☐
× ☐ ☐
______

☐ ☐
× ☐ ☐
______

☐ ☐ ☐
× ☐
______

☐ ☐ ☐
× ☐ ☐
______

☐ ☐ ☐
× ☐
______

☐ ☐
× ☐ ☐
______

1 3 5 7 9

2 4 6 8

P.O. 5.13.05.02

NAME: ______________________ CLASS: __________ DATE: ________

Guess and check to find the solutions to these problems.

1. Andre wants to take some friends to a concert. Seats in the orchestra cost $7 and seats in the balcony cost $5. He has $50.00 and wants to buy 8 seats. How many can be in the orchestra and how many can be in the balcony?

2. The product of two numbers is 315. The sum of the same numbers is 36. What are the numbers?

3. How many times would you subtract 27 from 6,493 to show a number less than 27 as a remainder?

Guess ______________

Check ______________

P.O. 5.13.05.02

NAME:____________________________________CLASS:________DATE:_______

Guess and check to find the solutions to these problems.

1. Andre wants to take some friends to a concert. Seats in the orchestra cost $7.00 and seats in the balcony cost $5.00. He has $50.00 and wants to buy 8 seats. How many can be in the orchestra and how many can be in the balcony?

2. The product of two numbers is 315. The sum of the same numbers is 36. What are the numbers?

3. How many times would you subtract 27 from 6,493 to show a number less than 27 as a remainder?

Guess _______________

Check _______________

Unit 60

5.06.07 DIVISION OF FRACTIONS

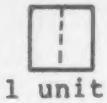
(2 lessons)

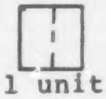
PERFORMANCE OBJECTIVES

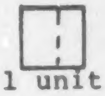
The Student will be able to...

5.06.07.01A divide a whole number by a fraction using representative materials;

e.g.,







5.06.07.02B name the reciprocal of any fraction;

e.g.,

reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$

reciprocal of $\frac{1}{2}$ is $\frac{2}{1}$

5.06.07.03B divide a whole number by a fraction renaming in simplest terms (multiplying by the reciprocal);

e.g.,

$$5 \div \frac{2}{4}$$

$$5 \times \frac{4}{2}$$

$$\frac{5}{1} \times \frac{4}{2} = \frac{20}{2} = 10$$

5.06.07.04B solve word problems related to skills learned in this module.

e.g.,

There were 3 sandwiches on a plate. Each one was cut in $\frac{1}{2}$. How many pieces were there?

$$3 \div \frac{1}{2}$$

$$\frac{3}{1} \times \frac{2}{1} = \frac{6}{1} = 6$$

There were 6 pieces.

5.06.07

VOCABULARY

TERMS

divisor
dividend
quotient
reciprocal
improper fraction
mixed number

GETTING STARTED

Prepare a set of ten cards with basic division facts and ten cards with matching quotients. Place the cards on the chalkboard ledge.

Ask a student to choose a card and turn it over. Say, "Read the example and give the quotient or read the quotient and name the matching example."

Ask the student to check his/her answer by multiplication.

Play "Fraction Concentration".

Prepare 10 cards with various fractions written on them.
e.g.,

$\boxed{\frac{1}{4}}$ $\boxed{\frac{4}{2}}$ $\boxed{2\frac{1}{3}}$

Prepare 10 more cards with matching fractional representations. Display the cards in two rows, face down.

Ask a student to pick two cards. Say, "Does the fraction match the picture?" If it does, the student keeps the match and goes again. If it is an incorrect match, the cards go back into proper position and another student has his/her turn.

Play continues until all cards have been matched.

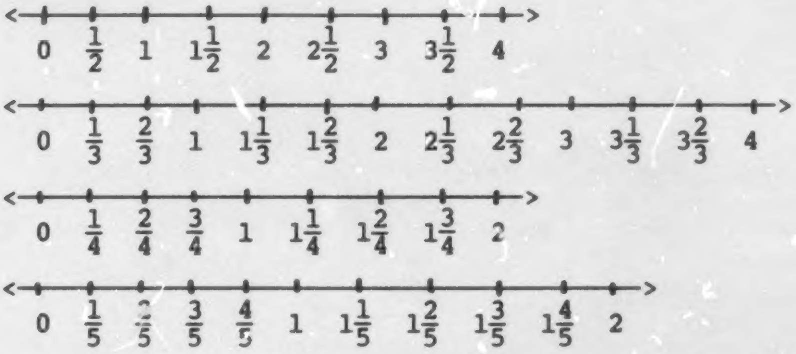
5.06.07

5.06.07.01 divide a whole number by a fraction using representative materials

STRATEGY 1: Prepare and distribute circles and squares. Prepare demonstration circles and squares divided into $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{8}$ and whole units. Say, "Place three circles on your desk." Place three circles on the chalkboard. Say, "How can we find how many halves are in three wholes?" Ask one student to come to the chalkboard and divide each circle in half. Say, "How many halves in 3?" (6)

Repeat this procedure using other examples.

STRATEGY 2: Draw the following number lines on the chalkboard. e.g.,


0 1/2 1 1 1/2 2 2 1/2 3 3 1/2 4
0 1/3 2/3 1 1 1/3 1 2/3 2 2 1/3 2 2/3 3 3 1/3 3 2/3 4
0 1/4 2/4 3/4 1 1 1/4 1 2/4 1 3/4 2
0 1/5 2/5 3/5 4/5 1 1 1/5 1 2/5 1 3/5 1 4/5 2

Say, "Look at the first number line." Ask a student to come to the chalkboard and point to 2. Say, "Starting at zero, how many halves are in 2? (4) How many halves are in 1? ...in 3? ...in 4?"

Repeat this procedure with the other number lines.

5.06.07.02 name the reciprocal of any fraction

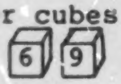
STRATEGY 1: Prepare two cubes numbered 1 through 6 and 7

STRATEGY 1: cont'd

through 12. Write $\frac{1}{3}$ on the chalkboard. Say, "What can I do to this fraction so that it equals 1?" (Multiply $\frac{1}{3}$ by 3 to equal 1.) Write $\frac{1}{3} \times \frac{3}{1} = \frac{3}{3} = 1$ on the chalkboard. Say, "Two numbers are reciprocals when their product is 1. The reciprocal of $\frac{1}{3}$ is $\frac{3}{1}$. The reciprocal of 3 is $\frac{1}{3}$."

Ask the students to prepare a sheet of paper folded into two columns. Ask a student to roll the two number cubes and form a proper fraction.

e.g.,



Say, "Read the fraction to the class. ($\frac{6}{9}$) Write $\frac{6}{9}$ in column one and, in column two, write its reciprocal ($\frac{9}{6}$)." Pass the cubes to the next student and repeat this procedure.

STRATEGY 2:

Prepare cards for the entire class. On half the set, write a fraction or a whole number. On the other half, write the reciprocals.

e.g.,

$$\boxed{\frac{1}{2}}\ \boxed{\frac{2}{3}}$$
$$\boxed{\frac{2}{1}}\ \boxed{\frac{3}{2}}$$

Write $\frac{1}{2}$ on the chalkboard. Say, "What can we multiply $\frac{1}{2}$ by to get a product of 1?" (2) Ask a student to come to the chalkboard and show his/her work.

e.g.,

$$\frac{1}{2} \times \frac{2}{1} = \frac{2}{2} = 1$$

Say, "A reciprocal of a given number is the inverse of that number."

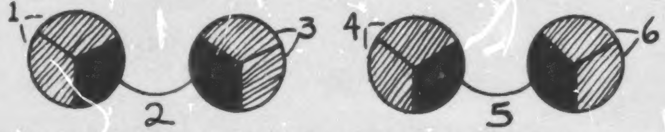
Distribute the cards. Ask a student to stand up and read the fraction on his/her card. Say, "Will the student who has the card with the reciprocal of this fraction please stand up and read the fraction that is on your card." Repeat this procedure until all the fractions have been matched with their reciprocals.

5.06.07

5.06.07.03 divide a whole number by a fraction renaming in simplest terms (multiplying by the reciprocal)

STRATEGY 1: Prepare and distribute four circles and scissors. Say, "Place the four circles on your desk and divide them into thirds. Mark each section $\frac{1}{3}$."

e.g.,



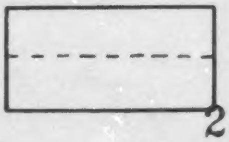
Say, "How many two-thirds are in 4? Use your scissors and cut each circle into thirds. Place them into groups of 2. How many groups of two-thirds did you make? (6) We can write this display as a mathematical sentence." Write $4 \div \frac{2}{3} = 6$ on the chalkboard.

Say, "We can prove that $4 \div \frac{2}{3} = 6$. To divide 4 by $\frac{2}{3}$ we must do something to the divisor. We must multiply by the reciprocal of the divisor. What is the reciprocal of $\frac{2}{3}$?" ($\frac{3}{2}$) Write $\frac{4}{1} \times \frac{3}{2} = \frac{12}{2} = 6$ on the chalkboard.

Say, "When we multiply 4 x 3 the numerator is 12. What does 12 represent? (The total number of thirds in 4 whole units.) What does the denominator 2 represent? (The number of thirds going into each group.) If we have 12 thirds and two thirds are going into each group, how many groups will we have? (6) There will be 6 groups of $\frac{2}{3}$s in 4 whole units."

STRATEGY 2: Prepare and distribute paper. Ask the students to fold the paper in half the long way and turn the paper sideways. With a pencil darken the center line.

e.g.,



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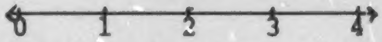
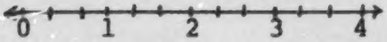
STRATEGY 2:
cont'd

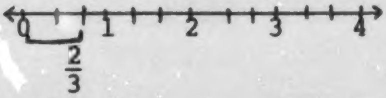
Say, "We are going to make a number line. Locate the center and below that point write 2. Mark the very beginning of the line 0. Midway between points 0 and 2, mark point 1. Mark the end of the line 4 and midway between point 2 and 4, mark point 3."
e.g.,



Ask the students to divide each whole unit on the number line into thirds. Demonstrate on the chalkboard.
e.g.,



Say, "Let's use the number line to find how many groups of two-thirds are in 4 whole units." Start at zero and count 2 one-third units. At what point on the number line are you? ($\frac{2}{3}$) This is one group of $\frac{2}{3}$." Bracket the group.
e.g.,



Repeat this procedure until all 4 units have been divided. Ask a student to write an example which would express the process just completed. Write $4 \div \frac{2}{3} = \square$ on the chalkboard. Ask another student to solve. Say, "The reciprocal must be used to solve this example."

e.g.,
$$4 \div \frac{2}{3} = \frac{4}{1} \times \frac{3}{2} = \frac{12}{2} = 6$$

Say, "What was the total number of thirds in 4 units? (12) We divided the 12 thirds into groups of two. How many groups of two-thirds did we have? (6) We do the same thing mathematically when we multiply by the reciprocal and rename the improper fraction in simplest terms."

5.06.07

5.06.07.04 solve word problems related to skills learned in this module

STRATEGY 1: Write the following problem on the chalkboard.

Susan made 6 sandwiches. Each sandwich was cut in thirds. How many one third pieces were there?

Ask a student to come to the chalkboard and write the number sentence.

e.g.,

$$6 \div \frac{1}{3} = \square$$

Ask another student to compute the quotient using the reciprocal of the divisor and label the answer.

STRATEGY 2: Give each student a quarter inch ruler, a 6" string and scissors. Ask the students to measure the string. Say, "How many $\frac{3}{4}$" pieces of string can we make from one piece? Line the string on top of the ruler. What should we do now?" Ask the students to cut the string every $\frac{3}{4}$ of an inch. Say, "How many $\frac{3}{4}$ inch pieces did you get?" (8) Record this as a mathematical sentence.

e.g.,

$$6 \div \frac{3}{4} = \square$$

Ask the students to solve the example.

e.g.,

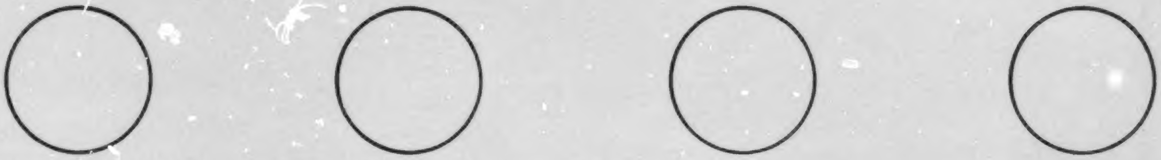
$$6 \div \frac{3}{4} = \quad \frac{6}{1} \times \frac{4}{3} = \frac{24}{3} = 8$$

Say, "What does 8 mean?" (There are 8 groups of $\frac{3}{4}$ in 6 whole units.)

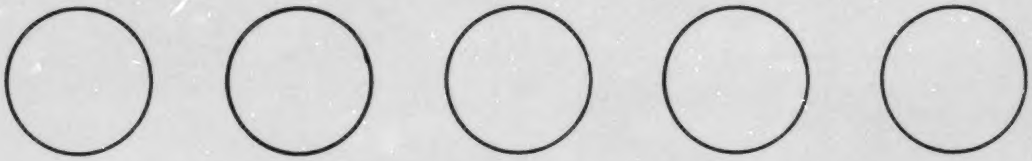
P.O. 5.06.07.01

NAME: ______________________________ CLASS: __________ DATE: ________

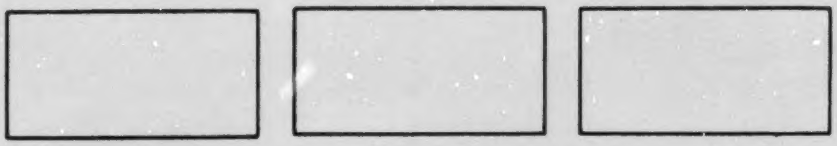
Divide each figure to find the quotient.



$$4 \div \frac{1}{2} = \square$$



$$5 \div \frac{1}{4} = \square$$



$$3 \div \frac{1}{6} = \square$$

P.O. 5.06.07.02

NAME:____________________________ CLASS:________ DATE:________

Find the reciprocal for the following fractions, improper fractions or whole numbers. Check by multiplying. Number 1 is done for you.

1)

$$\frac{2}{4} = \frac{\boxed{4}}{\boxed{2}}$$

CHECK:

$$\frac{2}{4} \times \frac{4}{2} = \frac{8}{8} = 1$$

2)

$$9 = \frac{\square}{\square}$$

CHECK:

3)

$$\frac{4}{3} = \frac{\square}{\square}$$

CHECK:

4)

$$\frac{\square}{\square} = \frac{1}{6}$$

CHECK:

5)

$$\square = \frac{18}{1}$$

CHECK:

6)

$$\frac{6}{8} = \frac{\square}{6}$$

CHECK:

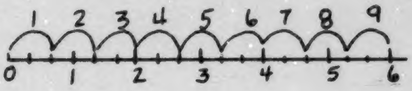
P.O. 5.06.07.03

NAME:____________________________________CLASS:________DATE:_______

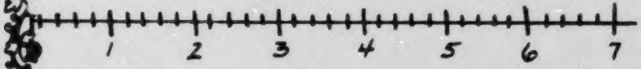
Find the quotient using the reciprocal of the divisor. Check your quotient using the number lines.

① $6 \div \frac{2}{3} = \square$

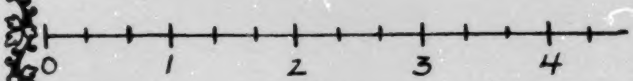
$\frac{6}{1} \times \frac{3}{2} = \frac{18}{2} = 9$


1
2
3
4
5
6
7
8
9
0
1
2
3
4
5
6

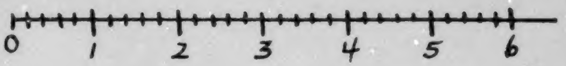
② $7 \div \frac{4}{5} = \square$



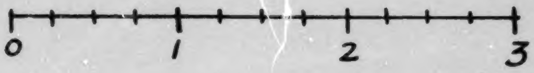
③ $4 \div \frac{4}{3} = \square$



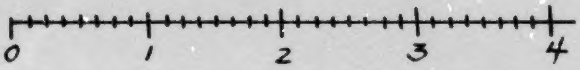
④ $6 \div \frac{2}{5} = \square$



⑤ $3 \div \frac{2}{4} = \square$



⑥ $4 \div \frac{4}{8} = \square$

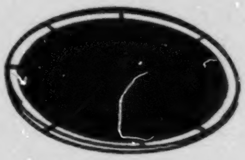


P.O. 5.06.07.03

NAME:________________________ CLASS:__________ DATE:________

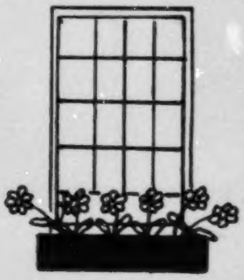
1. There were 5 cakes in a bakery. Each cake was cut into fourths. How many pieces were there?

2. Mrs. Jones bought 4 pizzas. She cut each pizza into eighths. How many pieces did she have?



3. How many pieces of metal each $\frac{2}{8}$ of an inch long can be cut from a metal bar that is 48 inches long?

4. Mrs. Johnson bought a 16 pound bag of potting soil. If she uses $\frac{4}{5}$ of a pound in each window box how many window boxes can she fill?



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Unit 61

5.06.08 DIVISION OF MIXED NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.06.08.01B divide a whole number by a mixed number and rename in simplest terms;

e.g.,

$$6 \div 3\frac{1}{2} =$$

$$6 \div \frac{7}{2} =$$

$$\frac{6}{1} \times \frac{2}{7} = \frac{12}{7} = 1\frac{5}{7}$$

5.06.08.02B solve word problems related to skills learned in this module.

e.g.,

We have 6 yards of rope. How many $\frac{2}{3}$ of a yard pieces can be cut from this rope?

$$6 \div \frac{2}{3} =$$

$$\frac{6}{1} \div \frac{2}{3} =$$

$$\frac{6}{1} \times \frac{3}{2} = \frac{18}{2} = 9$$

9 pieces can be cut from the rope.

VOCABULARY

TERMS

mixed number
improper fraction
reciprocal

GETTING STARTED

Draw a "Tic-Tac-Toe" game board on the chalkboard. Place a mixed number or an improper fraction in each square.

e.g.,

$4\frac{3}{4}$	$1\frac{5}{6}$	$2\frac{5}{7}$
$3\frac{1}{2}$	$\frac{7}{3}$	$4\frac{1}{3}$
$\frac{9}{2}$	$\frac{15}{7}$	$\frac{8}{4}$

Divide the class into two teams. The team that completes a line either vertically, horizontally or diagonally wins.

Say, "Look at the number in each box. Choose a box. If it is a mixed number, change it to an improper fraction. If the number is an improper fraction, change it to a mixed number."

Write the following fractions on the chalkboard.

e.g.,

$\frac{2}{9}$ $\frac{1}{2}$ $\frac{5}{9}$ $\frac{1}{5}$ $\frac{1}{3}$

$\frac{3}{2}$ $\frac{5}{2}$ $\frac{1}{4}$ $\frac{1}{6}$ $\frac{2}{7}$

Ask the students to name their reciprocals.

5.06.08

5.06.08.01 **divide a whole number by a mixed number and rename in simplest terms**

STRATEGY 1: Write the following example on the chalkboard.
e.g.,

$$7 \div 3\frac{1}{2} = \square$$

Say, "What does this example ask? (How many $3\frac{1}{2}$s can be taken out of 7?) What must we do before we can solve this example? (make both numbers fractions) Without changing the value of 7 how can we express 7 as a fraction? ($\frac{7}{1}$) $3\frac{1}{2}$ is a mixed number. Change it to an improper fraction." ($\frac{7}{2}$)

Write $\frac{7}{1} \div \frac{7}{2} =$ on the chalkboard. Say, "To divide a fraction you multiply by its reciprocal."
e.g.,

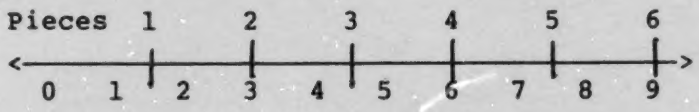
$\frac{7}{1} \div \frac{7}{2}$ becomes $\frac{7}{1} \times \frac{2}{7} = \frac{14}{7}$

$\frac{2}{7}$ is the reciprocal of $\frac{7}{2}$

Rename $\frac{14}{7}$ as 2.

Repeat this procedure to include dividing a mixed number by a whole number.

STRATEGY 2: Draw a number line on the chalkboard. Divide the number line into nine equal parts. Say, "Pretend this is a piece of ribbon. I want to cut it into pieces $1\frac{1}{2}$ yards in length. How many pieces will I have?" Ask a student to mark off $1\frac{1}{2}$ segments.
e.g.,



Write $9 \div 1\frac{1}{2} = \square$ on the chalkboard. Say, "What must we do? (Change the whole number and the mixed number to a fraction.) Next, we change the improper fraction to its reciprocal. Finally, multiply the

STRATEGY 2: cont'd

two fractions and rename in simplest terms."

e.g.,

$$\frac{9}{1} \div \frac{3}{2} = \frac{9}{1} \times \frac{2}{3} = \frac{18}{3} = 6$$

5.06.08.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard.

> A wire 9 feet long is cut into equal pieces of $4\frac{1}{2}$ feet. How many pieces do we have?

Ask a student to write the number sentence on the chalkboard.

e.g.,

$$9 \div 4\frac{1}{2} = \square$$

Ask another student to solve the problem and label the answer.

e.g.,

$$9 \div 4\frac{1}{2} = \frac{9}{1} \div \frac{9}{2}$$

$$\frac{9}{1} \times \frac{2}{9} = \frac{18}{9} = 2 \text{ pieces}$$

STRATEGY 2: Write the following word problem on the chalkboard.

> Ken has 7 jars. He bought $3\frac{1}{2}$ lbs. of mixed candy. He divided the candy equally among the 7 jars. How many pounds of candy is in each jar?

Ask a student to choose the correct operation. Ask another student to write the appropriate number sentence. Ask all of the students to solve the example at their seats.

e.g.,

$$7 \div 3\frac{1}{2} =$$

$$\frac{7}{1} \div \frac{7}{2} =$$

$$\frac{7}{1} \times \frac{2}{7} = \frac{14}{7} = 2 \text{ lbs. of candy is in each jar.}$$

P.O. 5.06.08.01

NAME: ______________________ CLASS: ________ DATE: ________

Find the quotient.

1) $4 \div 2\frac{1}{2}$

2) $6 \div 1\frac{2}{3}$

3) $5 \div 1\frac{3}{4}$

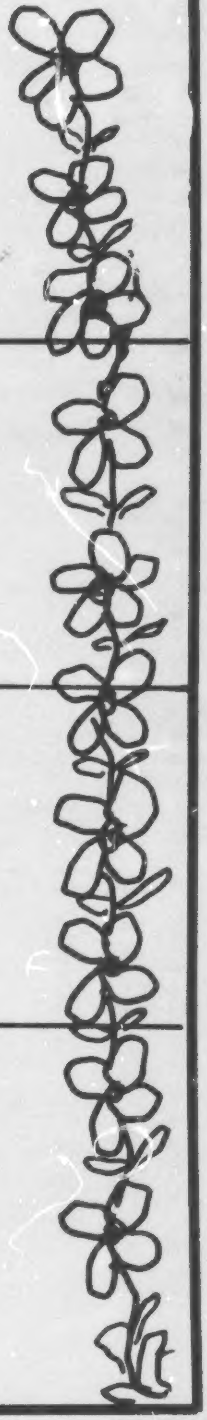
4) $3 \div 1\frac{4}{5}$

5) $10 \div 1\frac{1}{4}$

6) $9 \div 5\frac{1}{4}$

7) $60 \div 2\frac{1}{2}$

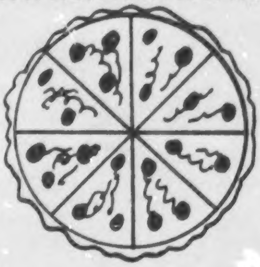
8) $90 \div 3\frac{1}{3}$



P.O. 5.06.08.02

NAME: ______________________ CLASS: ________ DATE: ________

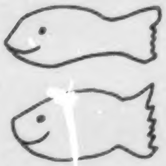
Solve each word problem.



1) There are 32 students in Mr. Reynolds class. If $\frac{3}{4}$ of the students like pizza, how many students do not like pizza?
Show all work

2) If Betty uses 2 cups of flour for each dozen cookies, how many cups will she use for $6\frac{1}{2}$ dozen cookies?
Show all work

3) Susan has 4 pies for her party. If she uses $\frac{1}{5}$ of a pie for each girl at the party party, how many girls can she serve from the 4 pies?
Show all work



4) While on vacation Joe caught 5 fish of equal weight. The total weight of the fish was $7\frac{3}{4}$ pounds. How much did each fish weigh?
Show all work

Unit 62

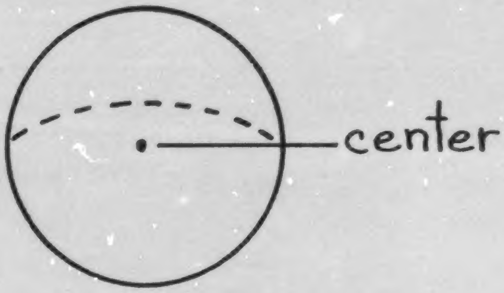
5.09.06 GEOMETRY - SPHERE

(1-2 lessons)

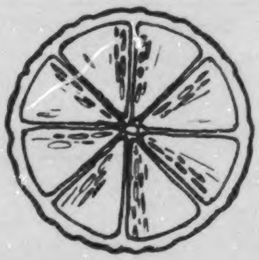
PERFORMANCE OBJECTIVES

The student will be able to...

5.09.06.01C recognize characteristics of a sphere; e.g., A surface having the property that all the points on its surface have the same distance from a fixed inside point called its center.



5.09.06.02C recognize that one-half of a sphere is called a hemisphere.
e.g.,



$\frac{1}{2}$ of an orange is a hemisphere.

5.09.06

VOCABULARY

TERMS

sphere
hemisphere

GETTING STARTED

Display a circle, a square, a rectangle, a triangle and a hexagon. Play "I Am Thinking of a Shape". The game is played by giving a clue and asking a student to name and identify the shape. Say, "I am thinking of a shape that has three sides. What is it?"

Repeat this procedure for other shapes.

Ask the students to look around the classroom and identify as many shapes as they can find. Make a chart on the chalkboard to list the students' findings.

e.g.,

Shape	Object
triangle	hanger
circle	
rectangle	
hexagon	

5.09.06

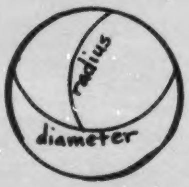
5.09.06.01 recognize characteristics of a sphere

STRATEGY 1: Prepare and display a paper plate, an orange and a globe. Say, "Who can describe the shpae of this paper plate?" (a circle) Use a compass to draw a circle on the chalkboard. Say, "All points on the circle are the same distance from the center. A circle is round and has only one dimension."

Display the orange. Say, "Who can describe the shape of this orange? (round like a circle) The orange is a sphere." Display the globe. Say, "The globe is also an example of a sphere. All points on the sphere are the same distance from the center. It is a space figure. It is not flat. It has three dimensions."

STRATEGY 2: Prepare a small punchball and draw a diameter and a radius on it with a magic marker.

e.g.,



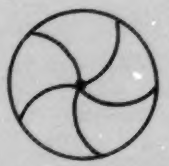
Display the ball to the class. Say, "This is a sphere. A sphere has a diameter which goes around the whole sphere. All points of the sphere are the same distance from the center."

5.09.06

5.09.06.02 **recognize that one-half of a sphere is called a hemisphere**

STRATEGY 1: Prepare an orange and a knife. Display the orange. Say, "This is a sphere. A sphere has all points the same distance from the center. It is not flat. It is a space figure." Cut the orange exactly in half.

e.g.,



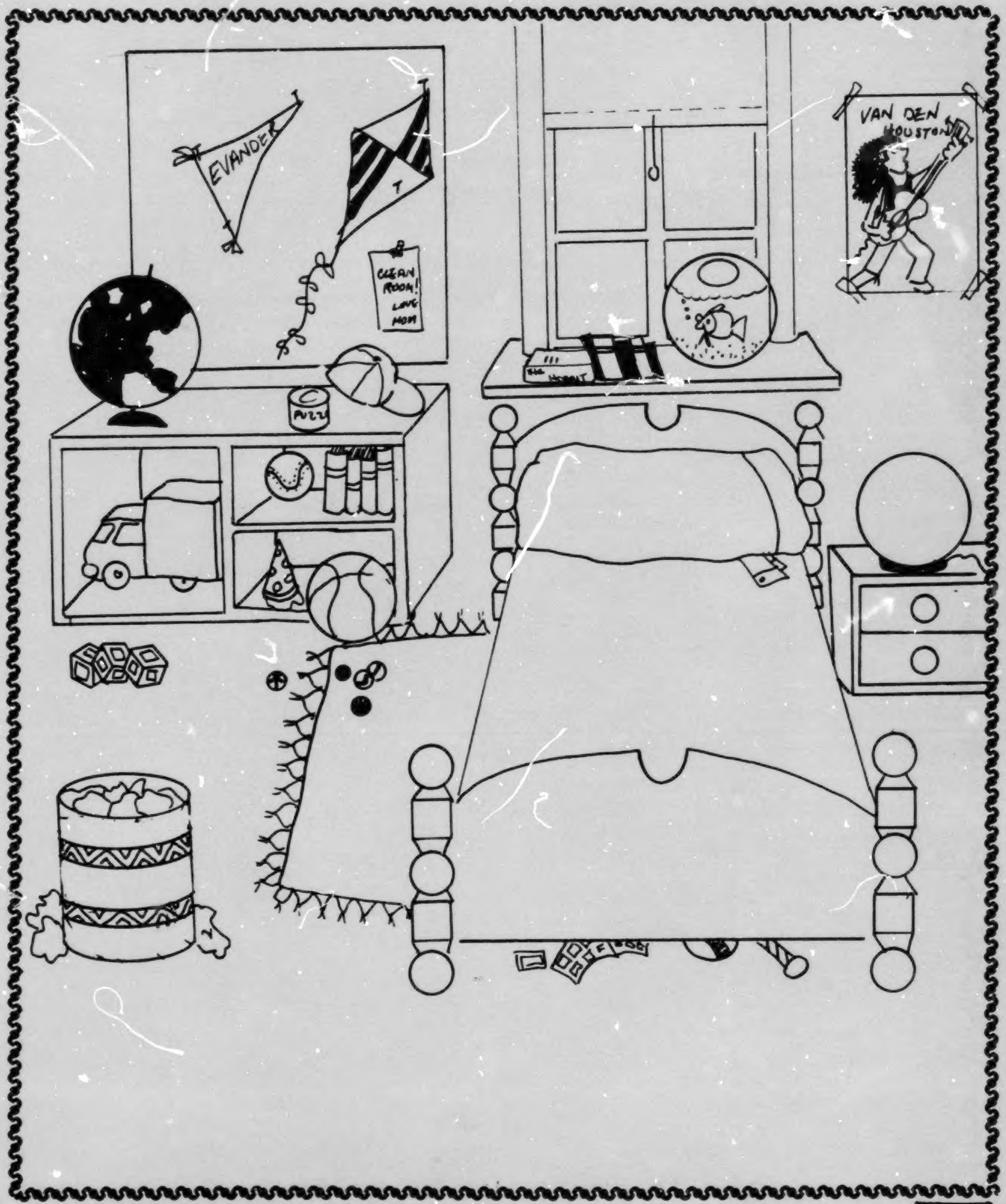
Say, "Each half of the sphere is called a hemisphere. The prefix hemi means half."

STRATEGY 2: Display a classroom globe. Say, "The earth is considered a sphere." Point out the equator. Say, "The equator is an imaginary line which is used to describe the center of the earth. We live north of the equator and people living in certain parts of South America, Africa and Australia live south of the equator. The equator divides the earth in half. Each half is called a hemisphere because the prefix hemi means half. There are two hemispheres, a northern hemisphere and a southern hemisphere. In which hemisphere do we live?" (northern)

P.O. 5.09.06.01

NAME: ______________________ CLASS: ________ DATE: ________

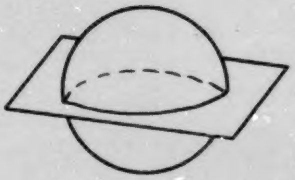
Color the spheres.

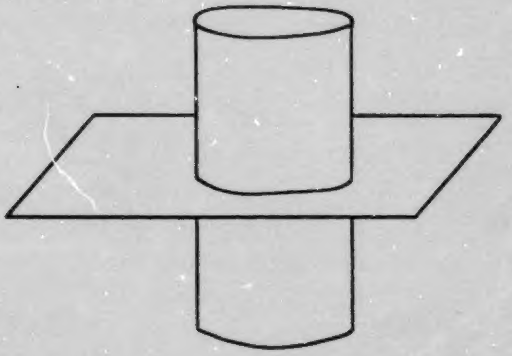

EVANDER
T
CLEAN ROOM! LOVE MOM
THE HOBBIT
VAN DEN HOUSTON
C PUZZ

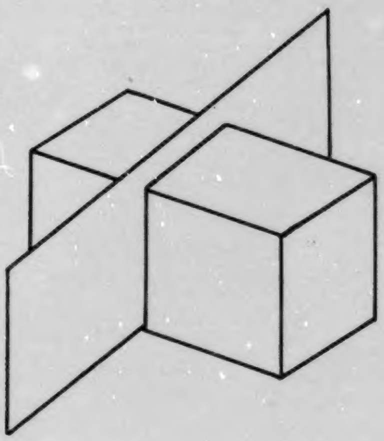
P.O. 5.09.06.02

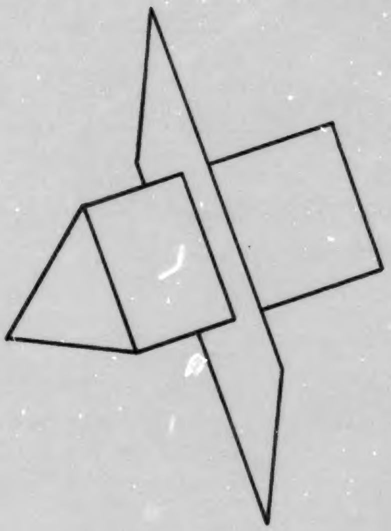
NAME:____CLASS:_________DATE:_______

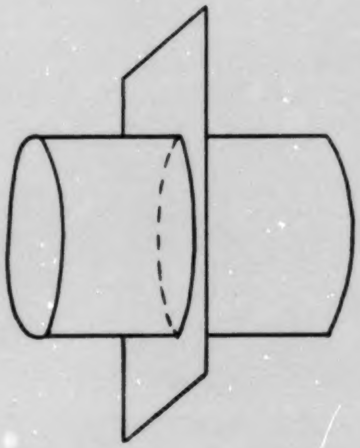
Place a check next to each intersection which creates two hemispheres.

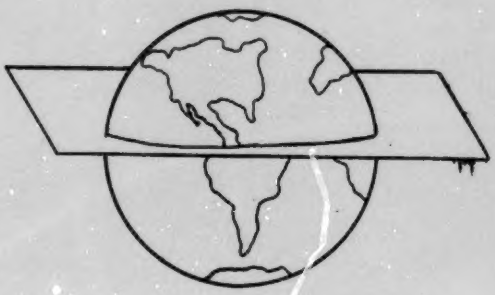












Unit 63

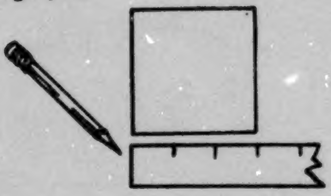
5.09.07 GEOMETRIC CONSTRUCTIONS

(2 lessons)

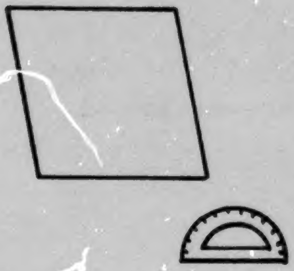
PERFORMANCE OBJECTIVES

The student will be able to...

5.09.07.01B construct polygons through pentagons using rules and/or protractors; e.g.,



5.09.07.02B construct a rhombus, a parallelogram and a trapezoid using a ruler and/or protractor. e.g.,



5.09.07

VOCABULARY

TERMS

polygon
quadrilateral

GETTING STARTED

Ask the students to identify shapes around the classroom, e.g., closet door surface = rectangle; window pane = square; coat hanger = triangle... Draw two columns on the chalkboard; column one having the pictures of each shape (triangle, square, rectangle, rhombus, parallelogram, and trapezoid) and column two having the name of each figure in random order. Ask the students to draw a line from the shape to its name.

Prepare and distribute geoboards and rubber bands. Ask the students to use a rubber band to make a shape with three sides. Say, "What is a three-sided shape called? (triangle) How many different triangles were made?" Ask different students to identify the types of angles they see in the triangles.

Repeat this procedure for the quadrilaterals (square, rectangle, rhombus, trapezoid, pentagon).

5.09.07

5.09.07.01 **construct polygons through pentagons using rulers and/or protractors**

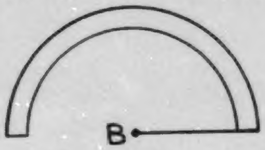
STRATEGY 1: Prepare and distribute protractors and rulers. Draw an angle (about 60°) on the chalkboard. Label the angle A. Say, "When we want to draw figures that are accurate, we often measure angles. The tool used to measure angles is called a protractor."

Draw a line 3 inches long on the chalkboard. Label the line BC. Ask the class to do the same at their seats.

e.g.,

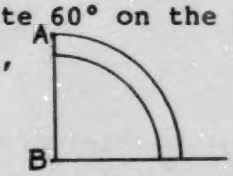
Demonstrate each step at the chalkboard. Say, "Place the protractor at point B so that point B lines up with the center of the protractor.

e.g.,



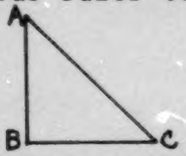
Locate 60° on the protractor and draw point A.

e.g.,



Use your ruler to connect AB and AC.

e.g.,



What figure did you construct?" (a triangle)

Continue this procedure using other angles and figures.

STRATEGY 2: Provide each student with a sheet of one inch ruled graph paper, a ruler, and a protractor. Using the

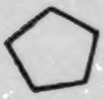
STRATEGY 2: cont'd

ruler, ask the students to draw a line that is 3 inches long. (One box is equal to one inch.) Say, "Label this segment AB. Use a protractor to measure a 60° angle at A and also at B. Use the ruler to finish the segments started as angles, making sure that they are also 3 inches long. This triangle has equal sides and, therefore, equal angles. Check by measuring that the top angle measures 60°."

Repeat this procedure, using the lines on the graph paper as guides for 90° angles in squares and rectangles. For the pentagon one base line may be drawn on the graph paper. Then the protractor is needed to form five 72° angles if a "regular" pentagon is desired. For any other pentagon sides and angles need not be the same.

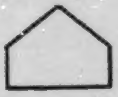
e.g.,

regular pentagon



(with equal sides
and angles)

pentagon



(not with
equal sides)

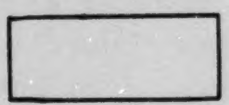
5.09.07.02 construct a rhombus, a parallelogram and a trapezoid using a ruler and/or protractor

STRATEGY 1: Prepare and distribute a large sheet of one inch ruled graph paper and a ruler. Say, "Use the ruler to trace a line on the graph paper that is 4 inches long (4 boxes long). Go up two rows of boxes and draw another line that is 4 inches long directly above the previous line segment. These lines are parallel. Connect the two lines by drawing line

STRATEGY 1: cont'd

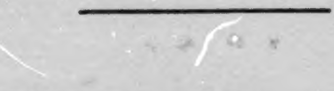
segments from the upper line to the lower line at each side. A rectangular parallelogram has been formed because the segments opposite each other are parallel."

e.g.,



Say, "Draw a line segment that is 4 inches long on another part of the graph paper and draw another line segment two rows above one box (one inch) over to the right." Demonstrate at the chalkboard.

e.g.,



Say, "Use a ruler to connect the sides."

e.g.,

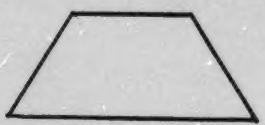
Ask the students to measure the slanty lnes. Say, "This is a parallelogram because the opposite sides are parallel to each other."

Use graph paper and rulers in this manner to construct a rhombus (a parallelogam whose 4 sides are equal, but has 2 acute angles and 2 obtuse angles).

Repeat this procedure using the lines on the graph paper as guides, to construct a trapezoid where only one set of opposite sides are parallel.

Ask the students to draw one line that is 4 boxes long (4 inches); then to go up three rows and draw a line that is 2 boxes long (2 inches).

e.g.,



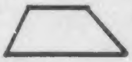
Ask the class to then connect the sides, forming a trapezoid. Ask the students to identify the parallel lines.

5.09.07

STRATEGY 2: Prepare and distribute drawing paper, rulers, protractors and pencils. Ask the students to construct a four-sided figure with four 90° angles. Say, "Draw the first line using the ruler, then construct the other lines using a protractor to make the 90° angles. What shape did you draw? This shape is a parallelogram because both sets of opposite sides are parallel." Repeat this procedure to construct a rhombus (the 4 sides must be equal but the angles are not all 90°: two are acute and two are obtuse). Say, "Draw a 5 inch line segment AB. At A, construct an angle that is 60° using the protractor, and at B construct an angle that is 120°.

e.g.,

Be sure that the segments that form the sides of each angle are 5 inches long. Finally, draw a line at the top of the figure to connect the figure."

Construct a trapezoid, e.g.,  , by asking the students to draw a 4 inch line segment using a ruler and labeling it AB.

Say, "Use the protractor to form a 60° angle at A and another one at B. Extend the segments formed by these angles, but do not let them cross each other. Stop each segment when they are about 2 inches apart . Finally use a ruler to connect the segments. We have now formed a trapezoid." Elicit from the students that a trapezoid has only one pair of opposite sides which are parallel. Use the protractor to measure the obtuse angles, too.

P.O. 5.09.07.01

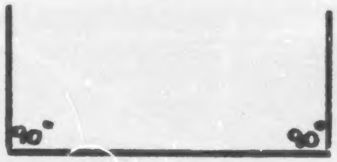
NAME: ______________________ CLASS: ________ DATE: _______

Use a ruler and a protractor to construct the following figures.

1. In the space below, construct a square whose sides are each 3 inches.

2. Construct a triangle that has three 60° angles.

3. Complete this figure of a pentagon. Two sides are missing. When the pentagon is complete, measure the other three angles.



P.O. 5.09.07.02

NAME:______________________________CLASS:________DATE:_______

Use a ruler and protractor to construct the following figures.

1. Construct a rhombus in the space below. Use the protractor to make it have 2 opposite angles of 60° and 2 opposite angles of 120°. Remember the sides must all be of equal length.

2. Construct a parallelogram with four 90° angles.

3. Construct a trapezoid whose base segment is 5 inches long and whose top segment is 3 inches long. Complete the figure and measure the other sides and all the angles.

Unit 64

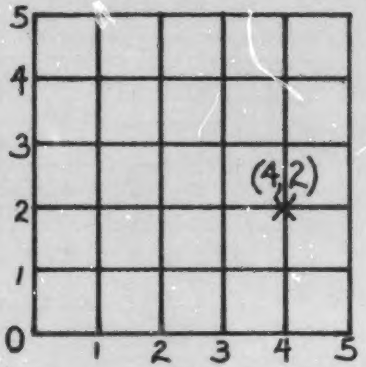
5.12.05 ALGEBRA - ORDERED NUMBER PAIR

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

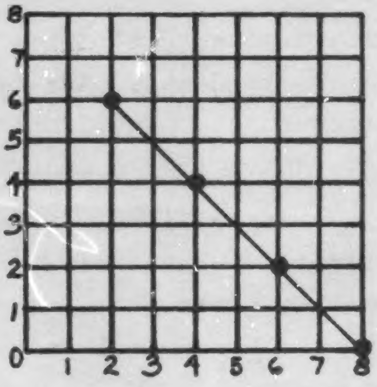
5.12.05.01A plot an ordered pair on a graph; e.g.,



5.12.05.02B solve equations with two variables to find ordered pairs and graph the results. e.g.,

□ + △ = 8

□	△	
2	6	(2,6)
4	4	(4,4)
6	2	(6,2)
0	8	(0,8)



+ =

5.12.05

VOCABULARY

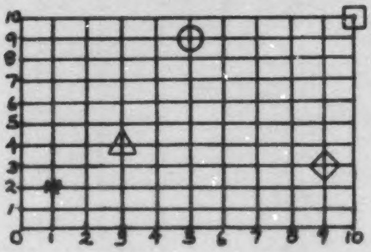
TERMS

coordinates
points
variables
equations
ordered pair

GETTING STARTED

Draw the following on the chalkboard.

e.g.,



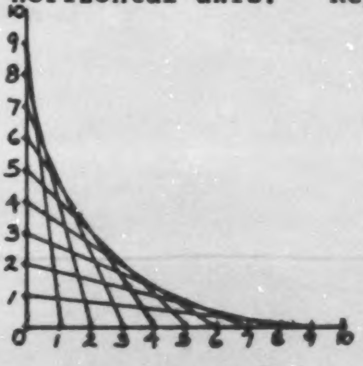
Ask the students to name the location of each shape by naming the ordered pair. e.g., (1, 2)

Ask students to draw points on the graph and ask other students to locate the points by naming the ordered pair.

Prepare and distribute paper on which vertical and horizontal axes are drawn. Ask the students to number each line from 1 through 10. Say, "What two numbers can you add together to get the sum of 10?" Record them on the chalkboard.

Say, "We will connect the first of the addends on the number lines." Draw a straight line from 10 on the vertical line to 0 on the horizontal. Say, "Now connect 9 on the vertical axis to 1 on the horizontal axis." Repeat this procedure.

e.g.,



5.12.05

5.12.05.01 plot an ordered pair on a graph

STRATEGY 1: Prepare and distribute graph paper. Draw a model of the graph paper on the chalkboard. Ask the students to number each axis from 0 through 10. Write an ordered pair of numbers on the chalkboard (4, 2) and ask the class to plot it on the graph paper. Demonstrate at the chalkboard. Write two more ordered pairs on the chalkboard, e.g., (2,4) (1,2), and ask the students to plot them. Say, "Connect these points. What figure did you make?" (triangle)

STRATEGY 2: Prepare and distribute graph paper. Draw the following graph on the chalkboard.

e.g.,

```
     6
     5
     4
     3
     2
     1
      0 1 2 3 4 5 6
```

Divide the class into two teams. Say, "We are going to play a game called 'Battle Ship'. Team A's captain will select three points to represent the location of their battle ships, e.g., (2,2) (2,3)(2,4). The captain will pass these locations to his team-mates. Team B will do the same thing, e.g., (4,1)(5,1)(6,1). (Each team should keep their locations secret.) Team A is given the chance to fire a bomb in an attempt to hit team B's ship. If the wrong location was selected, e.g., (5, 3), say "miss." Team B then selects a pair of numbers in an attempt to hit A's ship. If the correct location was selected, e.g., (2,2), say "hit." The game continues in this manner until one of the ships sink. (To sink a ship requires two hits.)

5.12.05

5.12.05.02 **solve equations with two variables to find ordered pairs and graph the results**

STRATEGY 1: Write □ + △ = 8 on the chalkboard. Say, "The square and the triangle are variables which can be replaced by the appropriate numbers." Ask a student to substitute number values for □ and △ . Ask another student to select two different numbers to make the equation true. Repeat this procedure for all of the numbers which can be substituted. List the numbers on the chalkboard in a function chart.

e.g.,

□	△
5	3
7	1
4	4

Draw a graph on the chalkboard. Ask students to plot these points. Ask another student to connect the points. Say, "What have we plotted on the graph?" (a straight line)

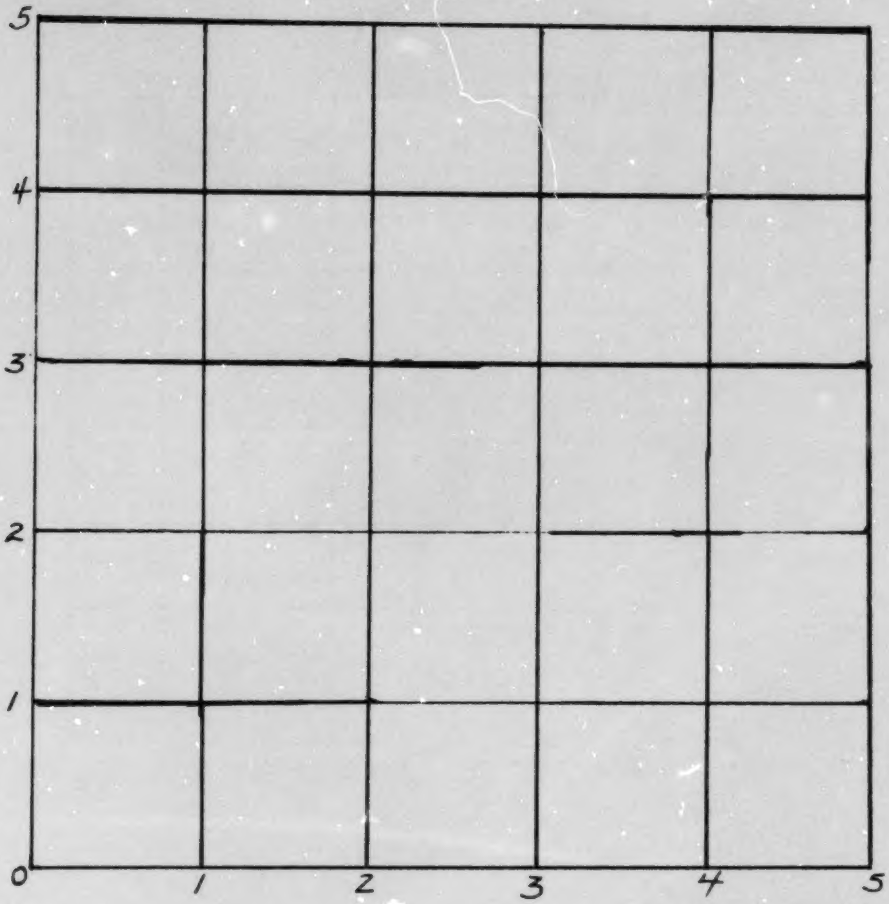
STRATEGY 2: Prepare and distribute geoboards and rubber bands. Write □ + △ = 5 on the chalkboard. Say, "We can substitute numbers for the variables represented by the square and the triangle." Ask a student to substitute two numbers for the variables, e.g., 1 and 4. Ask the students to find all of the pairs that make the number sentence true.

Say, "We are going to plot these numbers on the geoboards. Locate point 1, 4. Place a rubber band on that nail. Locate point 2, 3. Extend the rubber band from point 1, 4 to point 2, 3." Repeat this procedure until all the numbers have been plotted. Say, "What do you notice about your results?" (It is a straight line.)

P.O. 5.12.05.01

NAME: ______________________ CLASS: ________ DATE: ________

Draw the object at the indicated coordinate.



Object	Coordinates
House	$(\boxed{2},\boxed{3})$
Car	$(\boxed{4},\boxed{4})$
Face	$(\boxed{1},\boxed{1})$
Ball	$(\boxed{4},\boxed{2})$
Kite	$(\boxed{5},\boxed{3})$

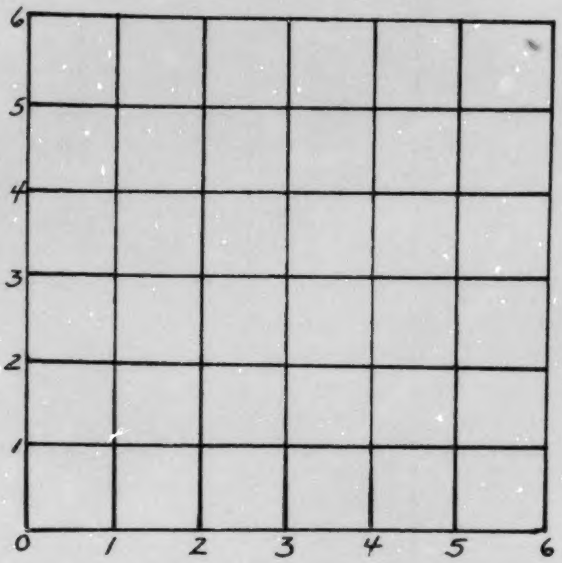
P.O. 5.12.05.02

NAME: ______________________ CLASS: ________ DATE: ________

Solve the equations. Fill in the variables and plot the coordinates.

□ + △ = 6

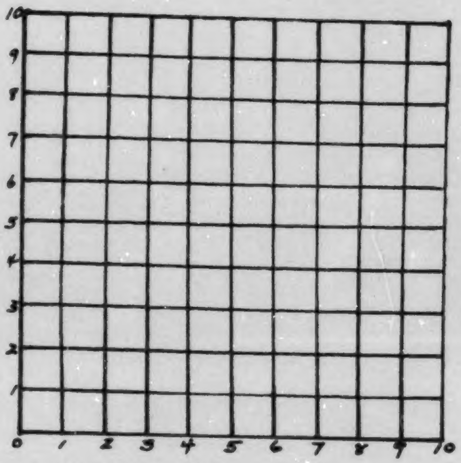
□	△



6
5
4
3
2
1
0
1
2
3
4
5
6

□ + △ = 10

□	△



10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
7
8
9
10

5.01.07 BASE 5

(1-2 lessons)

PERFORMANCE OBJECTIVESD

The student will be able to...

5.01.07.01A identify the basic symbols in base five; e.g.,

(0, 1, 2, 3, 4)

5.01.07.02A read a place value chart; e.g.,

$$\begin{array}{ccc} 25 & 5 & 1 \\ 5^2 & 5^1 & 5^0 \\ \hline 1 & 2 & 3 \end{array}$$

Note: In base five $5^0 = 1$, $5^1 = 5$ and $5^2 = 25$.

5.01.07.03B find the base ten equivalent of a base five number; e.g.,

$$\begin{array}{l} 123_{five} = \\ \quad 3 \times 5^0 = 3 \times 1 = 3 \\ \quad 2 \times 5^1 = 2 \times 5 = 10 \\ \quad 1 \times 5^2 = 1 \times 25 = \underline{25} \\ \qquad\qquad\qquad\qquad 38 \text{ ten} \end{array}$$

5.01.07.04B compare numbers in base five with numbers in base ten. e.g.,

$23_{ten} = 43_{five}$ $123_{five} = 38_{ten}$

5.01.07

VOCABULARY

TERMS

base 5
base 10
equivalent

GETTING STARTED

Draw a place value chart through ten thousand on the chalkboard. Write several numbers in the chart. Ask the students to read the numbers.

Write several other numbers on the chalkboard. Ask the students to read these numbers without using the chart.

Prepare a die.

Say, "We are going to try to write the largest 6-digit number possible. Draw a place value chart in your notebook through hundred thousands. I will roll the die and call out a number. Write that number in any place. Once you write a number you may not change its place."

Toss the die six times calling out each number.

The student who made the largest number rolls the die for the next game.

5.01.07

5.01.07.01 **identify the basic symbols in base five**

STRATEGY 1: Say, "We are going to explore a system of numeration which works with groups of five rather than groups of ten. This system is called the base five system of numeration. How many symbols are used in the base ten system? (10) How many symbols do you think would be used in a base five system?" (5) Ask a student to name the symbols he or she would use (0, 1, 2, 3, 4). Say, "There is no symbol '5' in the base five system of numeration."

STRATEGY 2: Say, "We are going to explore a system of numeration which works with groups of 5 rather than groups of ten." Write the symbols used for base ten on the chalkboard (0, 1, 2, 3, 4, 5, 6, 7, 8, 9). Ask a student to underline the first 5 symbols. Say, "These symbols are the symbols used in the base five system of numeration. The symbol '5' is not used." Write 3_{five} on the chalkboard. Say, "The word five near the lower right hand corner of the number tells us to what base we are referring. It means that we are not talking about ones and tens, but rather about ones and fives."

5.01.07.02 **read a place value chart**

STRATEGY 1: Draw a place value chart for the base ten on the chalkboard. Ask a student to place 3436 in the chart.

e.g.,

	Thousands 10^3	Hundreds 10^2	Tens 10^1	Ones 10^0
	10 x 10 x 10	10 x 10	10 x 1	
3436 =	3	4	3	6

5.01.07

STRATEGY 1: cont'd

Elicit from the students the explanations for the labeling in each column. (The exponents in Row 1, the multiplication in Row 2, and what each number represents in Row 3.)

Draw a place value chart for base five. Ask a student to fill in the chart for the number 1243_{five}.

e.g.,

	One hundred twenty-fives	Twenty-fives	Fives	Ones
	5^3	5^2	5^1	5^0
	5 x 5 x 5	5 x 5	5 x 1	
1234_{five} =	1	2	4	3

Ask students to write base five numbers in expanded notation using the place value chart.

e.g., $324_{five} = (3 \times 5^2) + (2 \times 5^1) + (4 \times 5^0)$

or

$(3 \times 25) + (2 \times 5) + (4 \times 1)$

STRATEGY 2:

Prepare pennies, nickels and quarters. Draw a place value chart for base five on the chalkboard.

e.g.,

5^2	5^1	5^0
twenty-five	fives	ones

Say, "When we think of numbers in base five we are talking about ones, fives and groups of five." Give a student one penny and ask another student to record this in the ones place. Repeat this procedure through four pennies. Say, "What do five pennies equal? (nickel) We exchange our five pennies for one nickel because in the base five system the digit five does not exist and we would have no way of recording our money."

Write $5_{10} = 10_5$ on the chalkboard. Point to the place value chart. Say, "We record this amount as 1 group of five (nickel) and zero ones (pennies)." Repeat this procedure through $24_{10} = 44_5$. Say, "We can never use the digit five so we must record

5.01.07

STRATEGY 2: cont'd

$24 + 1 = 100_5$ or one group of 25 (quarter) zero fives (nickel) and 0 ones (pennies)."

Repeat this procedure.

5.01.07.03 find the base ten equivalent of a base five number

STRATEGY 1: Prepare and distribute manipulative material that can be banded into groups of five, e.g., straws and rubber bands. Give each student a different number of straws. Ask the students to count their straws, make groups of five and put rubber bands around each group of five. All straws should be in bundles with the exception of remainders.

Say, "Take five groups of five and put a larger rubber band around that group. How many groups of twenty-five do you have?" Write the amount on the chalkboard. Say, "How many groups of five do you have?" Write the amount on the chalkboard. Say, "How many single objects do you have?" Write the number on the chalkboard.

e.g.,

1 group of twenty-five, 1 group of five,
1 single object

Write the number 111 on the chalkboard. Say, "In order to differentiate between base ten and base five, the number must be labeled 111_{five}. We read this number as one-one-one-base five." Ask the students to write the base five number to represent their straws in their notebooks. When the students are finished, ask them to unband their straws and count them using the base ten system. Ask the students to write the base ten number to represent the number of straws they have.

e.g., $111_{five} = 25 + 5 + 1 = 31_{ten}$

Repeat this procedure.

579

5.01.07

STRATEGY 2: Write the following on the chalkboard.
e.g.,
$10^0 = 1$, $10^1 = 10$, $10^2 = 100$, $10^3 = 1000$

Ask the students for the values for the exponential representations for base five, e.g., $5^0 = 1$, $5^1 = 5$, $5^2 = 25$, $5^3 = 125$.

Write $1438_{five} = (1 \times 5^3) + (4 \times 5^2) + (3 \times 5^1) + (8 \times 5^0)$ on the chalkboard. Ask the students to compute the base ten equivalent of this number.
e.g.,

$$\begin{array}{l} (1 \times 125) + (4 \times 25) + (3 \times 5) + (8 \times 1) = \\ \quad 125 \quad + \quad 100 \quad + \quad 15 \quad + \quad 8 \quad = 248_{ten} \end{array}$$

Repeat this procedure using other base five numbers.

5.01.07.04 **compare numbers in base five with numbers in base ten**

STRATEGY 1: Write a base five number on the chalkboard, e.g., 24_{five}. Ask a student to rewrite this number in expanded notation at the chalkboard.
e.g.,
$(2 \times 5^1) + (4 \times 5^0) = (2x5) + (4x1) = 10 + 4 = 14_{ten}$

Write a base ten number on the chalkboard, e.g., 37_{ten}. Say, "How many groups of twenty-five are in this number? (1) How many groups of five? (2) How many ones?" (2) Write the students reponses on the chalkboard.
e.g., $(1 \times 5^2) + (2 \times 5^1) + (2 \times 5^0) + = 122_{five}$

Repeat this procedure.

STRATEGY 2: Distribute manipulatives to students (sticks, straws, blocks, etc.). Students may have varying amounts. Write a base five number on the

STRATEGY 2: cont'd

chalkboard, e.g., 42_{five}. Ask the students to write this in expanded notation, e.g., $(4 \times 5^1) + (2 \times 5^0)$.

Ask students to use their manipulatives to identify the base ten equivalent of 42_{five} (22_{ten}).

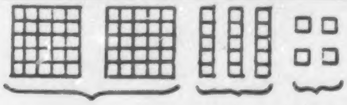
Write a base ten number on the chalkboard, e.g., 36_{ten}. Ask students to show this number using their manipulatives. Ask students to group their manipulatives using base five. Say, "How many groups of twenty-five? (1) How many groups of five? (2) How many ones?" (1) Elicit from the students that $36_{ten} = 121_{five}$.

P.O. 5.01.07.02

NAME: ______________________ **CLASS:** ________ **DATE:** ________

First: Write the base five numeral to represent each group of blocks.
Second: Write the base five numeral in exponential form.
Third: Compute the base ten numeral.

A)

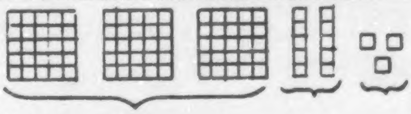


2 3 4

$\underline{234}_{\text{five}} = (2x5^2)+(3x5^1)+(4x5^0) =$

$50 + 15 + 4 = \underline{64}_{\text{ten}}$

B)

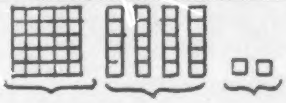


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

C)

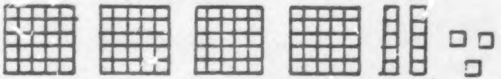


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

D)

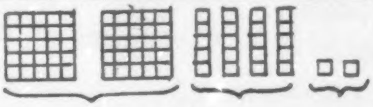


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

E)

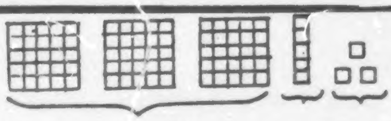


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

F)

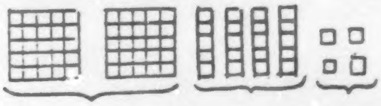


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

G)

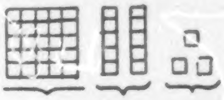


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

H)

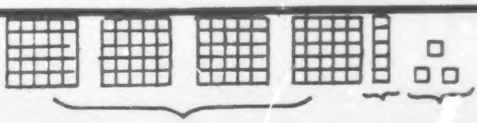


___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

I)



___ ___ ___

$\_\_\__{\text{five}} = (\_\_x5^2)+(\_\_x5^1)+(\_\_x5^0) =$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\__{\text{ten}}$

P.O. 5.01.07.03

NAME: ______________________ CLASS: ________ DATE: ________

Fill in the blanks A through J then complete the place value chart.

Numeral	=	One hundred-twenty five $5^{\_(a)}$ 125	Twenty-five $5^{\_(b)}$ ____(c)	Five 5^{1} ____(d)	Ones 5^{0} 1
324_{five}	=	(1×5^3) $(1 \times \_\_\_(e))$	(3×5^2) (3×25)	$(2 \times 5^{(f)})$ (2×5)	(4×5^0) $(4 \times \_\_\_(g))$
213_{five}	=	$(\_\_\_(h) \times 5^3)$ (0×5)	(2×5^2) $(2 \times \_\_\_(i))$	(1×5^1) (1×5)	$(3 \times 5^{\_(j)})$ (3×1)
43_{five}	=				
2132_{five}	=				
3_{five}	=				
1234_{five}	=				
312_{five}	=				

P.O. 5.01.07.04

NAME: ______________________ CLASS: ________ DATE: ________

Rewrite each base five numeral in expanded notation and then match it to its base ten equivalent.

		Base Ten Equiavalent
A. 312_{five}	$(3 \times 5^2) + (1 \times 5^1) + (2 \times 5^0)$ $(3 \times 25) + (1 \times 5) + (2 \times 1)$ $75 + 5 + 2$	
B. 1432_{five}		______ 58_{ten}
C. 24_{five}		______ 242_{ten}
D. 213_{five}		A 82_{ten}
E. 2102_{five}		______ 41_{ten}
F. 131_{five}		______ 14_{ten}
		______ 277_{ten}

5.01.08 BASE 12

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

5.01.08.01B identify a base 12 number and rename it as a base 10 equivalent;

e.g.,

$$18_{twelve} = 20_{ten}$$

5.01.08.02B identify the pattern of symbols in a base 12 (duo-decimal) system; ($T = 10_{ten}$, $E = 11_{ten}$)

e.g.,

0	1	2	...	9	T	E
10	11	12	...	19	IT	IE
20	21	22	...			

5.01.08.03B rename a decimal number (base ten) as a base twelve number.

e.g.,

$$14_{ten} = 12_{twelve}$$

$$158_{ten} = 112_{twelve}$$

5.01.08

VOCABULARY

TERMS

symbol
base 12
equivalent

GETTING STARTED

Prepare and display a clock. Say, "How many hours are represented on the clock? (12) How many times does the hour hand go around the clock in one day?" (2)

Ask the students to find how many hours are counted when the hour hand goes around the clock three times (36 hours) and four times (48 hours).

Prepare and distribute egg cartons.

Say, "How many eggs are in one dozen? How many in two dozen? ..."

Repeat this procedure by asking, "How many in one dozen and six extra eggs? How many eggs in two dozen and nine extra eggs? ..."

5.01.08

5.01.08.01 **identify a base 12 number and rename it as a base 10 equivalent**

STRATEGY 1: Prepare and distribute 12" rulers. Say, "When we measure a large object, in order to save time, we can count rulers and inches." Write on the chalkboard: 1 ruler + 4 inches. Say, "How many inches in all?" (16) Write 14_{twelve} on the chalkboard. Say, "We read this as one four base twelve. The word twelve near the lower right hand corner of the number tells us about which base we are talking. It means that we are not thinking about ones and tens, but rather about ones and twelves."

Draw a place value chart for base twelve on the chalkboard.

e.g.,

twelves	ones
1	4

Write the number 14_{twelve} in it. Say, "In our base ten system, if 1 in the tens place means 10, and 6 in the ones place means 6 ones, what do you suppose a 1 in the twelves place means? (1 x 12, or 12) What does a 4 in the ones place mean? (4 x 1, or 4.) Together they are equivalent to 16 in base ten."

Repeat this procedure.

STRATEGY 2: Prepare and distribute egg cartons and counters. Ask the students to place one chip in each section of the egg carton and hold three extra. Write 1 dozen eggs + 3 extra eggs on the chalkboard. Say, "How many eggs in all? (15) You just thought in base 12. You thought of the amount as 1 group of 12 and 3 ones left over or 15 in all. Instead of

STRATEGY 2: cont'd

counting tens and ones, you counted twelves and ones." Write 15_{twelve} on the chalkboard. Say, "The word twelve tells us how we grouped things. It also names the place immediately to the left of the ones place. 15_{twelve} means 1_{twelve} and 5 ones."

Draw place value charts for base 12 and base 10 on the chalkboard. Compare the base 12 to the base 10 place value chart.

e.g.,

one hundred forty-four	twelves	ones	hundreds	tens	ones
(12x12)	(1x12)	(1)	(10x10)	(1x10)	(1)

Ask the students to name the base 10 equivalent for base twelve numbers using the place value chart. Students may use their egg cartons and counters to help in the conversion.

e.g.,

	twelve	ones		(2x12)		(3x1)		
23_{twelve}	2	3	=	24	+	3	=	27
15_{twelve}	1	5	=	12	+	5	=	17
19_{twelve}	1	9	=	12	+	9	=	21

5.01.08.02 identify the pattern of symbols in a base 12 (duo-decimal) system (T = 10_{ten}, E = 11_{ten})

STRATEGY 1: Prepare several egg cartons leaving some of them whole to represent the twelves place. Cut one egg carton into its twelve separate sections to represent the ones place. Display one whole carton and 10 individual sections. Say, "How many eggs will this hold? (22) How can we write 22 base

STRATEGY 1: cont'd

twelve?" On the chalkboard, write the place value names "twelves" and "ones". Write a 1 in the twelves place on the chalkboard. Say, "We cannot write a two-digit number, 10, in the ones place. We can only write one digit in each place. We use the symbol 'T' to represent 10 units. What symbol do you think we could use to represent 11 ones? E is the symbol used by most people to represent 11 ones in base twelve." Ask students to express the numbers 1 through 20 in base twelve, using whole egg cartons and single egg sections.

STRATEGY 2: Prepare and distribute popsicle sticks and rubber bands. Ask the students to display 1 stick. Draw a place value chart for base twelve on the chalkboard. Write a 1 in the ones place. Ask the students to take 2 sticks. Write a 2 in the ones place. Repeat this procedure until 10 sticks are gathered. Say, "We cannot write the two digits, 1 and 0, in the ones place and we cannot put the 1 in the twelves place because we don't have a bundle of twelve. We use the letter 'T' to represent 10 ones in base twelve."

Write a "T" in the ones place in the place value chart on the chalkboard. When students gather 11 sticks, say, "We use 'E' to represent 11 because we cannot write two digits in the ones place." When 12 sticks are gathered, ask students to put a rubber band around them. Write a 1 in the twelves place and a "O" in the ones place to represent 1 group of twelve and zero ones. Ask students to continue counting in this manner until 48 sticks have been counted and bundled (40_{twelve}).

Say, "There are twelve symbols used in base twelve." Write them on the chalkboard. (0,1,2,3,4,5,6,7,8,9,T and E.)

5.01.08.03 **rename a decimal number (base ten) as a base twelve number**

STRATEGY 1: Prepare egg cartons and poker chips. Give one student 14 chips. Ask him/her to put one chip in each section of the egg carton. Say, "Are there enough chips to fill one egg carton? (Yes) How many are left over?" (2) Draw a place value chart for base twelve on the chalkboard, e.g., Twelves Ones.

Say, "When we have a full egg carton, we have 1 group of twelve." Write a 1 in the twelves place. Say, "For the 2 ones which were left over, we write a 2 in the ones place." Rewrite the number outside the place value chart as 12_{twelve}. Repeat this procedure using 28 chips.

Say, "When numbers become very large, it is not convenient to count individual chips. Think about grouping twelves." Enlarge the place value chart at the chalkboard to include the place that is twelve times larger than the twelves place.

e.g.,

one hundred forty-fours	twelves	ones
(12 x 12)	(1 x 12)	(1)

Say, "How can we express a large number, such as 150_{ten} in base 12? How many 144's there are in 150?" (1) Put a 1 in the 144 place. Say, "How many are left over? (6) Are there any groups of twelve in six?" (No) Put a zero in the twelves place. Say, "Are there any ones?" (6) Put a 6 in the ones place. Therefore, $150_{ten} = 106_{twelve}$.

STRATEGY 2: Draw a place value chart on the chalkboard. Ask students for the name and value of each place.

e.g.,

one hundred forty-fours	twelves	ones
(12 x 12)	(1 x 12)	(1)

Say, "In order to write a base ten number as its base twelve equivalent, we have to think about grouping twelves. In the number 20_{ten}, how many 12's are there? (1) How many are left over?" (8) Write 1, 8 in the place value chart.

e.g.,

one hundred forty-fours	twelves	ones
	1	8

Next to the place value chart, write $20_{\text{ten}} = 18_{\text{twelve}}$.

Write a 3-digit base ten number, e.g., 158, on the chalkboard and ask the students to express it in base twelve. Say, "How many 144's are there?" (1) Write a 1 in the 144's place. Say, "How many are left over? (14) Can we make any groups of 12?" (1) Write a 1 in the twelves place. Say, "How much is left over?" (2) Place a 2 in the ones place.

Write on the chalkboard, $158_{\text{ten}} = 112_{\text{twelve}}$.

Repeat this procedure using other 2- and 3-digit numbers.

P.O. 5.01.08.01

NAME: ______________________ CLASS: __________ DATE: ________

FOR EACH BASE TWELVE NUMERAL, FIND ITS EQUIVALENT IN BASE TEN.

11_{twelve} = __________

21_{twelve} = __________

10_{twelve} = __________

24_{twelve} = __________

13_{twelve} = __________

29_{twelve} = __________

16_{twelve} = __________

24_{twelve} = __________

19_{twelve} = __________

40_{twelve} = __________

22_{twelve} = __________

32_{twelve} = __________

20_{twelve} = __________

30_{twelve} = __________

14_{twelve} = __________

23_{twelve} = __________

42_{twelve} = __________

12_{twelve} = __________

50_{twelve} = __________

33_{twelve} = __________

P.O. 5.01.08.02

NAME: ______________________ CLASS: ________ DATE: ________

FILL IN THE BLANKS IN EACH SERIES OF NUMBERS IN BASE TWELVE.

a). 0_{twelve} 1_{twelve} 2_{twelve} 3_{twelve} ________

b). 7_{twelve} 8_{twelve} 9_{twelve} T_{twelve} ________

c). 9_{twelve} ________ E_{twelve} 10_{twelve} 11_{twelve}

d). 10_{twelve} 11_{twelve} ________ 13_{twelve} ________

e). 18_{twelve} 19_{twelve} ________ $1E_{twelve}$ ________

f). 25_{twelve} 26_{twelve} 27_{twelve} ________ ________

RENAME EACH BASE TWELVE NUMERAL AS A BASE TEN NUMERAL.

Base Twelve Number	Base Ten Number	Base Twelve Number	Base Ten Number
a). 13_{twelve} =	________	f). 41_{twelve} =	________
b). 20_{twelve} =	________	g). 30_{twelve} =	________
c). $1E_{twelve}$ =	________	h). $2E_{twelve}$ =	________
d). $2T_{twelve}$ =	________	i). T_{twelve} =	________
e). $1T_{twelve}$ =	________	j). 11_{twelve} =	________

P.O. 5.01.08.03

NAME: ______________________ CLASS: __________ DATE: ________

DRAW A LINE TO CONNECT EACH BASE TEN NUMERAL WITH ITS BASE TWELVE EQUIVALENT.

28_{ten}

42_{ten}

33_{ten}

23_{ten}

36_{ten}

17_{ten}

150_{ten}

160_{ten}

152_{ten}

155_{ten}

29_{twelve}

30_{twelve}

106_{twelve}

24_{twelve}

114_{twelve}

108_{twelve}

36_{twelve}

$10E_{\text{twelve}}$

$1E_{\text{twelve}}$

15_{twelve}

Unit 67

5.10.09 DISTANCE

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

5.10.09.01C recognize the formula for distance; e.g.,

Rate times Time = Distance
R x T = D

5.10.09.02C solve word problems related to skills learned in this module. e.g.,

John drove an average of 55 miles an hour. How far did he drive in 3 hours?
R x T = D
55 x 3 = 165 miles

5.10.09

VOCABULARY

TERMS

formula
distance

GETTING STARTED

Draw a "Tic-Tac-Toe" game board on the chalkboard. Place multiplication examples of various difficulty in each square. e.g.,

3x5	26x80	7x1
100x10	30x50	42x22
19x3	2x6	27x9

Cover each square with a blank paper. Divide the class into two teams.

Say, "Team X goes first. Choose a square. Take off the paper. If your team solves the example, you claim the square with an X. If the answer is wrong, Team O gets a chance. If neither team solves the example correctly, I will substitute a new example and cover the square again."

The first team to get three boxes in a row wins the game.

Prepare tongue depressors. Write a double operation example on each depressor, e.g., 3 x 7 + 1. Give each student a stick. Ask the students to compute the answer. Ask a student to read his problem aloud. The winner is the person in the group with the highest answer.

5.10.09

5.10.09.01 **recognize the formula for distance**

STRATEGY 1: Write the following example on the chalkboard.

> Tom rode his bike for 3 hours at a rate of 8 miles an hour. How many miles did he ride his bike?

Say, "One way to solve this example is to add."

e.g.,

$$\begin{array}{l} 8 \text{ miles} = 1 \text{ hour of riding} \\ 8 \text{ miles} = 1 \text{ hour of riding} \\ +8 \text{ miles} = 1 \text{ hour of riding} \\ \hline 24 \text{ miles} = 3 \text{ hours of riding in all} \end{array}$$

Say, "What is a faster way to do the example? (multiplication) What would the example be? (the rate, 8 miles an hour, times the time, 3 hours) We can use symbols to help us write the example. What can we use for rate? (R) ...for time? (T) ...for distance? (D)

e.g.,

$$R \times T = D$$

Let's substitute numbers for the letters.

e.g.,

$$8 \times 3 = 24$$

If we know the rate and the time we can always find the distance."

STRATEGY 2: Write the following problem on the chalkboard.

> Tom rode his bike for 3 hours. His speed was 8 miles an hour. How many miles did he ride his bike?

Say, "We will make a chart to help us understand this problem." Draw the following chart on the chalkboard.

Rate	Time	Distance

Say, "How fast was Tom going? How far did he go in one hour?" Ask a student to fill in the chart, e.g., $\begin{array}{c|c|c} R & T & D \\ \hline 8 & 1 & 8 \end{array}$. Say, "What if the boy rode his bike 2 hours?" Ask a student to come up and fill in the

5.10.09

STRATEGY 2: cont'd

second row, e.g., $\begin{array}{c|c|c} R & T & D \\ \hline 2 & 8 & 16 \end{array}$. Say, "Our problem says Tom rode for 3 hours, what numbers should go in on the third row of the chart? $\begin{array}{c|c|c} R & T & D \\ \hline 3 & 8 & 24 \end{array}$ 24 miles is our answer. Is there a faster way to solve the problem? Look at the chart for help." (multiply rate times time) Write the formula and the number sentence on the chalkboard.

e.g.,

R x T = D   8 x 3 = 24

5.10.09.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard.

> An ant crawls 4 inches in 1 minute. How far can the ant go in 3 minutes?

Say, "We can solve this problem by using the formula for distance." Write the formula on the chalkboard and ask a student to substitute the appropriate numbers.

e.g.,

R x T = D   4 x 3 = 12

STRATEGY 2: Write the following problem on the chalkboard.

> A man drives a car 50 miles an hour. How far can he drive in 3 hours?

Say, "One way to solve problems is to ask questions. For example, about what is this problem talking? (a man driving) Do we know anything about the man? (Yes, he drives his car 50 miles an hour.) How many hours does he drive? (3 hours) What do we have to find? (How far the man can drive.) Do we have a formula for distance?" (R x T = D) Write the formula on the chalkboard and ask a student to substitute the numbers in the example for the letters.

e.g.,

R x T = D   50 x 3 = 150 miles

P.O. 5.10.09.01

NAME: ______________________ CLASS: ________ DATE: ________

Remember Rate times Time = Distance (It is the same as Time times Rate = Distance). Fill in the box.

RATE times TIME equals DISTANCE

① $3 \times 5 = \square$

② $2 \times \square = 8$

③ $6 \times 4 = \square$

④ $7 \times \square = 14$

⑤ $\square \times 3 = 12$

⑥ $4 \times 5 = \square$

⑦ $\square \times 9 = 900$

⑧ $60 \times 30 = \square$

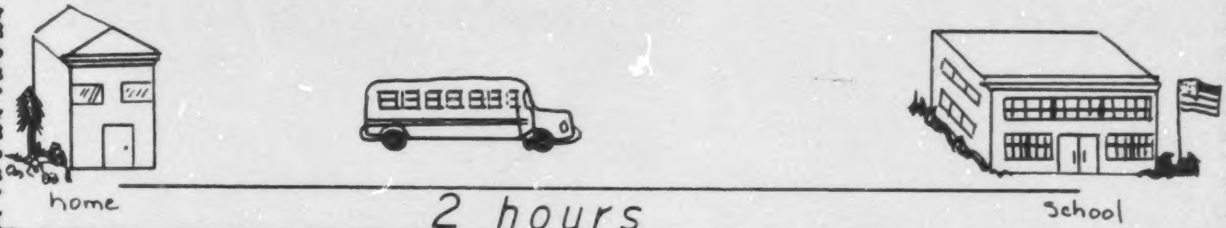
P.O. 5.10.09.02

NAME: ______________________ CLASS: ________ DATE: ________

Look at the pictures. Solve the problems based on the information supplied.

How many miles? ______

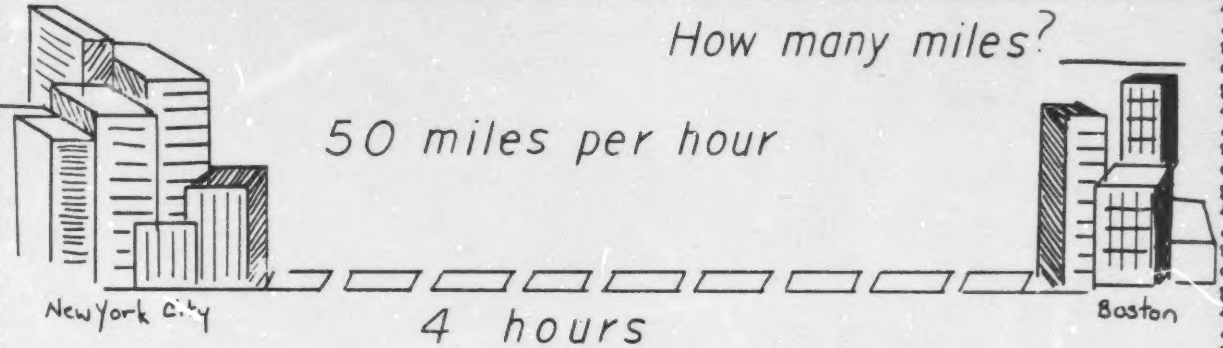
40 miles per hour


home
School

2 hours

How many miles? ______

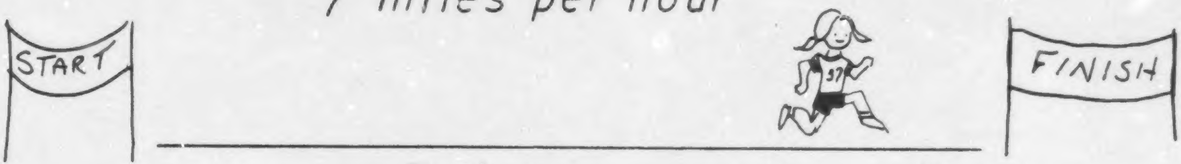
50 miles per hour


New York City
Boston

4 hours

How many miles? ______

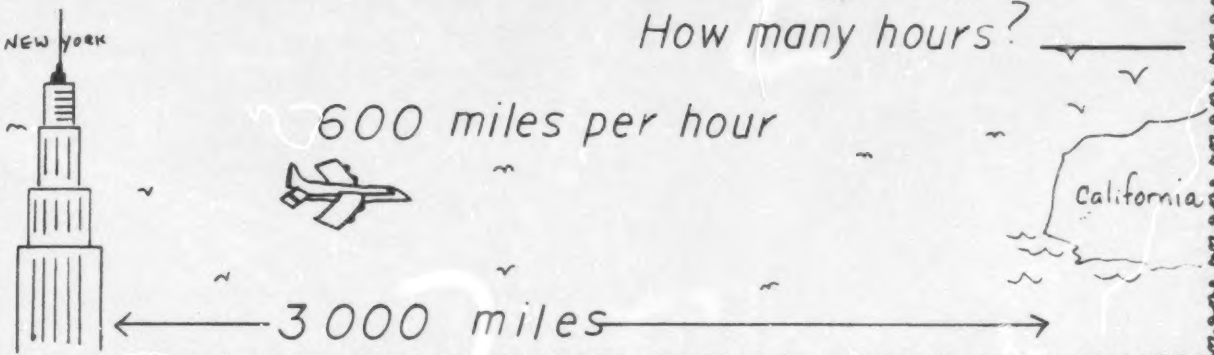
7 miles per hour


START
37
FINISH

3 hours

How many hours? ______

600 miles per hour


NEW YORK
California

3000 miles